THE CHEMICAL AGE

VOL. LVI 28 JUNE 1947 No 1459

TECHNOLOGY DEPARTMENT

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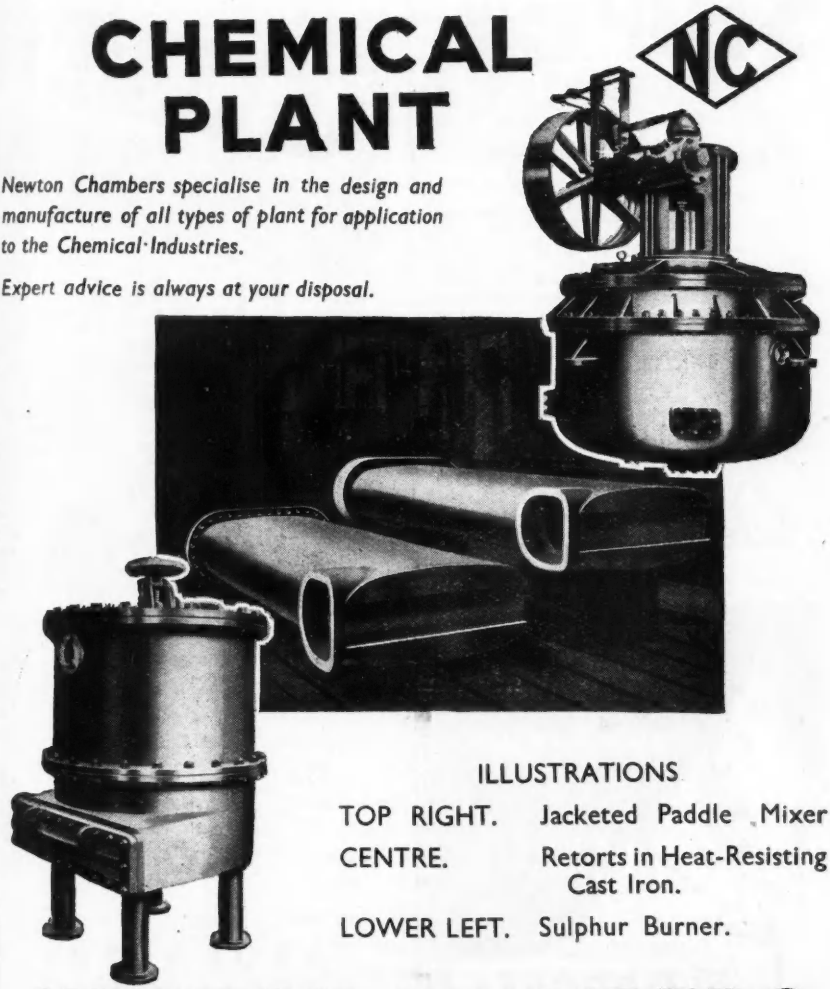

ILLUSTRATIONS

TOP RIGHT. Jacketed Paddle Mixer

CENTRE. Retorts in Heat-Resisting Cast Iron.

LOWER LEFT. Sulphur Burner.

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Experts

EVERYONE knows the Judge's opinion of expert witnesses, but not everyone knows how widespread is that view. We are told on good authority, indeed on expert authority, that as long ago as 1877, Lord Salisbury writing to Lord Lytton penned this damning indictment of the experts of his time: "No lesson seems to be so deeply inculcated by the experience of life as that you should never trust experts. If you believe the doctors, nothing is wholesome; if you believe the theologians, nothing is innocent; if you believe the soldiers, nothing is safe. They all require to have their strong wine diluted by a very large admixture of common sense." More recently, someone who had evidently lost his money was heard lamenting that the experts who had prophesied the result of the Derby had proved to be singularly unreliable, and his friend added to his grief by admonishing him that since the experts had declared the thing to be certain to come to pass, he had only himself to thank for not acting contrary to their opinion, as everyone in full possession of his senses would do. In this disconcerting world, faith in the expert has dwindled to a very small vulgar fraction. That in itself must be disconcerting to many of our readers who are experts in one or other of the branches of chemistry or the chemical industry. When we read that a Minister of the Crown began his speech in Parliament with the words: "My experts tell me . . . . " we know he has already lost his case since he has himself thrown doubts of the most grave character upon the plan that he is about to unfold.

This universal disbelief in the powers of the expert is no light matter. Believe it or not, the expert is in fact the man (or woman) who knows more about the subject than most others. The intrinsic value of experts, however, is variable and relative. In the average gathering, the man who has matriculated is an expert; to his examiners he is something less than the dust, whose mistakes, made in perfectly good faith, are the cause of much ribald merriment in the Common Room and may even feature in our own cartoons. This brings powerfully to our mind the realisation that knowledge is also relative. The savants who laugh at the mistakes of their pupils, for all they know, may themselves be the subject of laughter in high heaven for the tenacity and assurance with which they declare to be truths things that are in fact not true. In the course of our professional life we have been impressed by the desire of those who are not expert to secure from those who are, crude, blunt advice as to the course of action to be taken in given circumstances. The real expert is ever mindful of his own short-comings. He knows that his counsel must be a compromise between many different courses. The pros and cons are nicely balanced, and he would be content if he could state the problem, leaving others to decide the issue. Alas, that is not possible. On all sides the expert is confronted with the cry: "Tell us what to do!" If he does not answer that cry, if he does not accept the challenge, he is no expert; his reputation is gone. If he answers it, quite often he is as likely to be wrong as not, because the course of action he will suggest may be inappropriate, not because it is wrong, but because of some consideration outside his ken as an expert. Lord Salisbury was

On Other Pages

thus right in his declaration that all experts require to have their strong wine diluted by a very large admixture of common sense.

This matter of the expert advice, however, is not lightly to be disregarded. It is very important that the expert should come into his kingdom. Life is so complex that whether he be a chemist advising upon chemistry, an engineer upon engineering, or even a politician upon politics, the fact is that without that advice we should be floundering as we have floundered for many years. The expert is, in truth, very necessary. *The Times*, for example, has lately declared that "the present demand for scientists in industry is insatiable, and it is impossible to pretend that the best way of allocating limited resources of scientific man-power has yet been found." What are scientists in industry but "experts?"

In all this confusion of thought, there emerges a lesson. It is that the men of affairs should not ask the expert to go beyond his sphere; "One should never ask a savant the secrets of the universe that are not in his particular show-case," said Anatole France; "he takes no interest in them." The opinion of the expert is to be sought only on those subjects in which he is truly expert, and in which, being expert, he realises his own limitations. Beyond that lies the field of pure commonsense in which one man's guess is as good as another's. Thus the plea for scientists to take part in Government is not necessarily well founded, because the scientist has his limitations no less than the politician; there is a need for a combination of the scientist with the man of affairs, so that in the multitude of counsellors there may be found wisdom. Many pour scorn on committees; as bodies for arriving at the truth of any particular matter, there is much to be said for a well chosen committee comprising experts in many directions likely to be of service in arriving at a sound conclusion. When that conclusion is reached, when a course of action has been decided upon, when the time for action has arrived, then let the committee be disbanded. To translate thought into action a committee of one is the best of all.

There is a good deal here that intimately concerns the management of scientists, even of engineers, in industry. The business man at the head must make many hard decisions. He should not expect his "expert" staff to make them for him. They will advise him, each in his own sphere. The decision requires the correlation of all the expert advice, a leavening of business experience, and a large sprinkling of common-sense.

NOTES AND COMMENTS

Exports Down—

THE fuel crisis of the winter and spring, with its concomitant electricity and gas cuts, is only an unpleasant memory to most people. The immediate effects—shut-down, unemployment and discomfort—have passed. But the long-term effects are still with us and may remain for many months or years to come. We are reminded of this by the chemical export figures for May, which show, at £2,705,362 only a £50,000 increase over the figures for April, and a decline of over £1 million compared with the same month last year (May, 1946, £3,854,939). During the first five months of this year the value of chemical exports has fallen by nearly £3,500,000 compared with the same period last year. Taking into account the steady rise in prices of all chemicals during the past year, the real decline in our chemical exports is much more serious than these figures show. Among the more spectacular decreases were: Ammonium sulphate from 24,101 tons in May, 1946, to 13,258 this May, ammonium nitrate from 17,472 tons to 766, bleaching powder from 86,407 cwt. to 22,712, calcium carbide from 9734 cwt. to 1856, copper sulphate from 10,750 tons to 548, disinfectants and insecticides from 60,618 cwt. to 49,930, glycerine from 12,096 cwt. to 67, caustic soda from 240,428 cwt. to 96,652, sodium nitrate from 24,378 cwt. to 1095, and sodium sulphate from 52,494 cwt. to 37,900. There was also a reduction of 75 per cent in soap exports. Among the few items with increased exports may be mentioned tar oils 3,552,340 gal. (296,588), lead tetraethyl 105,052 gal. (none), and sodium carbonate 263,124 cwt. (233,175). Over 130,000 mega units of penicillin were also exported.

—Imports Up

ALTHOUGH on the whole the amount of chemicals, drugs, dyes and colours which were imported was smaller than during May last year, the total value increased from £1,828,490 to £2,479,573 (£2,101,287 in April this year). Imports of potassium compounds were much the same as last year (483,299 cwt.: 429,382), sodium compounds were reduced from 455,456 cwt. to 5287 (6880 cwt. in April). Imports of carbon blacks from the U.S.A. were 43,193 cwt. compared with 81,284 in May last year. These figures contain a serious warning of the repercussions in the chemical industry of fuel crises. It is to be hoped that figures for later months will lend themselves to a greater optimism than the May figures. But the latest coal production figures do not seem to offer much hope in that direction.

Frustration

"GOVERNMENT policy is creating a feeling of frustration among the rank and file of our members and the members of other unions." That is the considered view of a prominent trade unionist expressed last week by Mr. Archibald McDougal, presiding at the Ayr conference of the Amalgamated Union of Foundryworkers; and in his main conclusion, at all events, he inadvertently expressed a feeling with which the managerial sections of his industry has long been familiar. There for the moment the unusual identity of interests seems to end, notwithstanding the fact that at no time has there been so urgent a need of unstinted collaboration by every player in the industrial team—in production if not in politics. How this is to be achieved is one of the most pressing

Sporty One: ***What is it?***

Harold: ***It's a pilot plant for the large-scale production of oxygen by the action of sunlight on watercress.***

problems of our time of which a plethora of "Work or Want" posters or even the Ministry of Fuel's hortatory advertisements about the need for greater effort in the mines (in the *Sunday Times*!) do not promise to offer a solution.

Collaboration

MORE promising from all points of view is a revival among all groups of workers of the kind of relationship to the job which was more common before large-scale production became the rule, the identification of the worker with the product, which as a substitute for the craftsmanship of former times is the best the modern industrial set-up can offer. The suggestion is not as revolutionary as it sounds. The war-time results of "educational" trips by aircraft and munitions workers to airfields and gun-sites proved that the principle works. A more recent application of the idea is the "get together" scheme which is being operated with rather surprisingly successful results by a South Wales steel foundry—Brown, Lennox & Co.—and a Wolverhampton motor firm they have supplied for more than 20 years. Parties of workers from each undertaking have visited the works of the other "to see how the other chap does it." What they saw has generated such interest that the managements, which provided the holiday and the transport, say they never made a better investment and that the scheme must go on. This, moreover, is a microcosm of the wider ideal outlined by a speaker at the recent meeting in London of the Industrial Co-partnership Association—of creating an honest, realists' relationship between labour and capital—and of effecting close collaboration by the Government with private firms, which the Political and Economic Planning Group is now urging. Without such collaboration and concentration on the job—at all levels—talk of prosperity drives will remain meaningless.

I.C.I. ISSUES PLASTICS PATENTS WRITS

IT is reported that five Dutch plastics manufacturing firms have been warned by writ of the Imperial Chemical Industries, Ltd., that they must discontinue the making of Perspex and Plexiglas kind of plastics (that are extensively used here for the manufacture of sets of teeth, etc.) on methyl- or methacrylate base. The British concern claims exclusive patent rights for this kind of plastic, but the Dutch manufacturers assert that they are working by German processes that became State property after the war and freely accessible to everybody by licence in Holland. In the middle of 1946 a special conference was held in London about these patents. They were then released in every country where they had been registered. The Dutch firms maintain that their position is unique because an Englishman or an American, for instance, may freely use the German patents in Holland, whereas a Dutchman may not do so in the U.K. or in the U.S. where American or British firms were already in possession of the respective licences. The application for the registration in Holland was made by the German firm Böhm und Haas as long ago as 1928. They were made public in 1933 and granted in 1937. On the other hand, the British patents were applied for here in 1932, published in 1934 and granted in 1935.

Should the Dutch firms be forced to stop their production for Holland, the possibility would yet exist of the manufacture in countries which had not granted registration to the German applicants, or else for the firm to switch over to Dutch patented basic plastics. It is understood, however, that Böhm und Haas had applications granted in many countries. It appears certain that the Dutch firms concerned would prefer to talk the whole matter over with the I.C.I. and to make some arrangements rather than embark on lengthy lawsuits.

The Dutch plastic industry has made rapid progress mostly from scratch. Some 15,000 to 20,000 kg. are already being turned out each year. Apart from the five firms in question a number of other plastic producing firms have been set up recently.

New Scottish Plastics

Efforts are now being made in Scotland, to produce a plastic like timber, consisting of wood chips, sawdust, or heather compressed under heavy pressure. Three current developments include the firm of Michael Nairn & Co., who have perfected the production of a floor covering with plastic as the main ingredient. The material is suitable for use on concrete floors and also as wall panelling. Another Kirkcaldy firm is experimenting in the production of plastic floor tiles, designed to overcome the problem of concrete floors, and the Scottish Co-operative Wholesale Society, Ltd., has started the erection of a pilot plant to produce plastic bonded heatherwood.

Chemical Exports Fall Again

More Than a Million Pounds Less in May

A DROP of over £1,149,000, representing more than one-third, in British chemical exports in May by comparison with the figures a year ago is one of the material factors in the serious import-export deficiency revealed again by the monthly *Trade and Navigation* Accounts (H.M.S.O., 4s. 6d. net). The total value of chemical exports in May was £2,705,362. In May, 1946, exports were worth £3,854,939. Last May's figures are, however, slightly better than those for April.

Almost every category of chemicals has contributed to the total reduction, very marked falls having been recorded for the fertiliser group and a general but smaller reduction for sodium compounds, with the exception of sodium carbonate which shows a healthy revival. The total reduction would undoubtedly have been considerably heavier but for the contribution on the credit side of a further rise in shipments of tar and anthracene fuel oils, which at 3.5 million gallons were exactly 12 times as large as the export in May, 1946, and showed an increase of more than 340,000 gallons on the previous month's figures.

Among chemical imports in May, most fertilisers showed fairly sharp reductions, which help to explain the larger cut in our shipments of corresponding materials, but there was a steady upward tendency in the potassium chemicals. Imports of carbon blacks were almost halved, but greater purchases appear to have been made in most other directions, resulting in a rise of some £651,000 in the total sum expended in May on foreign chemicals, drugs, dyes and colours.

EXPORTS OF CHEMICALS

	May, 1947	May, 1946
	Cwts.	Cwts.
Citric acid	568	2,353
Formic acid	2,175	3,314
Tartaric acid	168	976
	Tons	Tons
Aluminium oxide	487	1,057
Sulphate of alumina	2,429	2,614
Sulphate of ammonia	13,258	24,101
Nitrate of ammonia	766	17,472
	Cwts.	Cwts.
Chloride of lime	22,712	86,407
Calcium carbide	1,856	9,734
Naphthalene (excluding naphthalene oil)	784	4,473
	Gals.	Gals.
Tar oil, anthracene and other heavy coal tar oils	3,552,304	296,588
	Tons	Tons
Copper sulphate	548	10,750
	Cwts.	Cwts.
Disinfectants, insectides, weedkillers	49,930	60,618
Glycerine	67	12,096
Lead acetate, litharge, red lead, etc.	5,322	9,648
Potassium compounds	5,468	6,693
	Tons	Tons
Salt	9,082	13,448
Sodium carbonate (including soda crystals, soda ash and bicarbonate)	263,124	233,175
Caustic soda	96,652	240,428
Sodium chromate and bichromate	120	2,822
Synthetic sodium nitrate	1,095	24,378
Sodium sulphate	37,900	52,494
Other sodium compounds	84,362	88,997
Total value, chemical manufactures	**£ 2,705,362**	**£ 3,854,939**

IMPORTS OF CHEMICALS

	May, 1947	May, 1946
	Cwts.	Cwts.
Acetic acid	13,054	10,347
Boric acid	8,800	1,400
Other acids	737	108
Borax	15,984	10,440
Bromine	184	—
Calcium carbide	24,554	—
Coal tar products (excluding benzol and cresylic acid)	1,503	12,219
	Tons	Tons
Ammonium phosphate	8	1,786
Manufactured fertilisers	9,977	31,502
	Cwts.	Cwts.
Potassium caustic and lyes	322	1,701
Potassium chloride	455,405	426,071
Potassium nitrate	990	—
Potassium sulphate	25,196	200
All potassium compounds	483,299	429,382
Sodium nitrate	—	455,373
Carbon blacks	44,598	85,724
Total value, chemicals, drugs, dyes and colours	**£ 2,479,573**	**£ 1,828,490**

EXPORTS OF METALS

	May, 1947	May, 1946
	Tons	Tons
Pig-iron	4,970	886
Ferro-alloys	156	6,445
Manufactured iron and steel	12,477	31,414
Castings and forgings	3,626	7,469
Steel sheets and plates	15,031	38,229
Steel sheets under ⅛ in.	3,764	4,867
Tinned plates	11,722	9,137
Total iron and steel and manufactures	**164,118**	**255,513**
	Cwts.	Cwts.
Aluminium and alloys	58,771	40,054
Brass and other copper alloys	91,292	126,571
	Tons	Tons
Copper	6,465	5,717
	Cwts.	Cwts.
Tin solder	1,795	9,958
Tin blocks, ingots, etc.	527	3,405
Total value, non-ferrous metals and manufactures	**£ 3,437,453**	**£ 3,732,307**

IMPORTS OF METALS

	May, 1947	May, 1946
	Tons	Tons
Iron ore and concentrates	644,039	578,122
Manganiferous ore and concentrates	7,000	18,500
Bauxite ore and concentrates	8,825	7,660
Chromium ore	5,213	3,209
Copper ore	3,340	1,888
Manganese ore	21,422	100
Iron pyrites	15,970	14,794
Tin ore and concentrates	2,208	6,143
Titanium ore	6,499	3,925
Zinc ore and concentrates	8,893	10,083
	Cwts.	Cwts.
Molybdenum ore	5,901	132
Total value, non-ferrous metalliferous ores and scrap	**£ 1,858,033**	**£ 1,896,474**

XI CHEMICAL CONGRESS

SUMMARY OF SUBJECTS AND SPEAKERS

FOR the duration of the XI International Congress of Pure and Applied Chemistry, lasting from Tuesday, July 17, to Tuesday, July 24, London will accommodate more distinguished chemists than at any time since 1938, when the last international chemical congress was held. Some 1600 chemists have indicated their intention of being present at the congress in their normal capacity and about 300 others are coming as official delegates of their countries.

Numerically, British chemists will, naturally, preponderate and the most strongly represented overseas countries will be France, Italy, the U.S.A., the Scandinavian countries and Switzerland. At the time of going to press it was uncertain whether the Russian chemical industry will be officially represented, but the Soviet Ambassador has agreed to be a member of the Committee of Honour.

The congress, of which H.M. the King is patron, will be formally opened by the president, Lord Leverhulme at the Central Hall, Westminster, and will close there with a lecture by Sir Robert Robinson, president of the Royal Society. All other sessions will be held at the Imperial College of Science, South Kensington.

Given below and on following pages is a summary of the speakers and subjects of general chemical interest. This programme is, of course, subject to alterations in detail.

Section 1 : Inorganic and Geo-Chemistry

FRIDAY, JULY 18, 09.00-12.30
Hon. President : Prof. Linus Pauling (Switzerland).

Reactions in Solids: X-Ray Methods in Inorganic Chemistry: J. A. HEDVALL and S. E. STERZEL (Gothenburg), Development of Chemistry of Solids, 1912-1947; G. M. SCHWAB (Athens), Lattice Orientation in Topochemical Reactions; J. BROCARD (Paris), Hydration of Tetracalcium Aluminoferrite; H. P. ROOKSBY and A. H. McKEAG, X-Ray Analysis in the Study of Inorganic Phosphors; H. L. RILEY, X-Ray Crystallography of Amorphous Carbon; R. FAIVRE and G. CHAUDRON (Vitry-sur-Seine), Use of a Curved-crystal Monochromator and Focussing Chambers in the X-Ray Analysis of Crystalline Powders; R. FAIVRE (Vitry-sur-Seine), Study of the Structure, Transformations, and Thermal Decomposition of Mixed Alkaline-earth Carbonates.

SATURDAY, JULY 19, 09.00-12.30.

Miscellaneous Topics in Inorganic Chemistry: B. LEADBEATER and R. WHYTLAW-GRAY, Accurate Comparison of Molecular Weights of Nitrogen and Carbon Monoxide by a Modification of the Method of Limiting Pressures; G. LAZZARI (Novara), Preparation of Hydroxylamine by Electrolytic Methods; R. F. HUDSON, Vapour-phase Hydrolysis of Non-Metal Chlorides; B. A. LISTER, Chromatography in the Purification of Inorganic Materials; J. T. KENDALL and D. YEO, Preparation of Pure Silicon Carbide.

TUESDAY, JULY 22, 09.00-12.30.

Geochemistry and the Structure of Minerals: The late V. M. GOLDSCHMIDT (Oslo), Principles of Modern Geochemistry; W. H. TAYLOR, Recent Developments in Examination of Mineral Structures; G. W. BRINDLEY (Title not yet available); E. BRANDENBURGER (Zurich), X-Ray Studies on Building Materials made of Fired Clay; J. T. KENDALL and W. SPRAGGEN, Synthetic Mica.

WEDNESDAY, JULY 23, 09.00-12.30.

Radiochemistry and Radiation Chemistry: (Mlle.) M. PEREY (Paris), Francium: Element 87; G. BOUSSIERES and M. HAISSINSKY (Paris), Chemical and Electrochemical Properties of Protactinium in Micro-quantities; M. HAISSINSKY and G. BOUSSIERES (Paris), Colloidal State of Some Radioactive Solutions; F. S. DAINTON and N. MILLER (Title not yet available).

Section 2 : Physical Chemistry

FRIDAY, JULY 18, 09.00-12.30.
Hon. President : Prof. Linus Pauling (U.S.A.).

Spectra and Structure: H. W. THOMPSON, Recent Developments in the Technique and Applications of Infra-Red Measurements; J. LECOMTE, Studies in Infra-Red Spectra; J. M. ROBERTSON, Bond Lengths in Aromatic Hydrocarbons; C. A. COULSON, Calculation of Bond Lengths; P. and R. DAUDEL, On the Molecular Diagram Method and Its Application to the Study of the Physical, Chemical and Physiological Properties of the Molecules; A. MACCOLL, The Quantum Theory of the Colour of Organic Compounds; D. P. CRAIG, Energy Levels in Naphthalene; E. CLAR, The Ancllation and Condensation Principle with Relation to Aromatic Hydrocarbons.

SATURDAY, JULY 19, 09.00-12.30.
JOINT SYMPOSIUM WITH SECTIONS 10 *and* 11.

Polymers: H. W. MELVILLE, Synthesis and Properties of Highly Branched Super Ester Molecules; J. B. SPEAKMAN, Cross-

Linking and Polymerisation Reactions in Keratin; T. ALFREY and H. MARK (U.S.A.), Mechanism of Copolymerisation; R. HILL and R. H. DAVIES, Polymer Constitution and Fibre Properties; J. T. KENDALL and R. H. DAVIES, Thermal Diffusion in Liquids; P. M. DOTY, S. SIGNER and H. MARK (U.S.A.), Size and Configuration of Polymer Molecules in Solution; G. B. B. M. SUTHERLAND, Application of Infra-Red Studies to the Structure of Polymers; H. COLE, Structural Effects of Colours in Glass.

MONDAY, JULY 21, 09.00-12.30.

H. M. POWELL, Molecular Compounds; R. P. BELL, Electron Deficient Molecules; J. BLEARS, Principles of Design of Mass Spectrometers; G. C. ELTENTON, The Study of Reaction Intermediates by Means of a Mass Spectrometer; H. G. THODE and R. L. GRAHAM, Isotope Abundance Measurements.

TUESDAY, JULY 22, 09.00-12.30.

Catalysis and Reaction Rates: G. M. SCHWAB (Greece), The Absolute Velocity of Contact Catalysis; F. H. CONSTABLE (Turkey), Dynamics of Selective Catalytic Autopoisoning; L. BATEMAN and J. L. BOLLAND, The Thermal and Photo Oxidation of Some Non-Conjugated Olefins; G. I. P. LEVENSON, On the Kinetics of the Reduction of Silver Bromide by Complex Photographic Developers; R. BRDICKA (Czechoslovakia), Polarographic Determination of the Rate of Certain Reactions Taking Place at the Dropping Mercury Electrode; J. HEYROVSKY (Czechoslovakia), The Use of Oscillographic Potential-Time Curves in Polarography.

WEDNESDAY, JULY 23, 09.00-12.30.

E. ABEL, On the Calculation of the H_2SO_4 Vapour Pressure Above the System Sulphuric Acid-Water; P. O. KINELL (Sweden), Ultracentrifugal Sedimentation of Concentration Dependent Substances; B G. RANBY (Sweden), Fractional Precipitation of Cellulose Nitrates; A. E. AMBLER, Application of the Tiselius Electrophoretic Technique to Synthetic Surface-Active Agents; C. COURTY, Contribution à l'Etude des Phénoménes d'Absorption par Utilisation d'un Champs Magentique Faible; F. GALLAIS (France), Sur l'Emploi des Mésures de Pouvoir Rotatoire Magnétique a la Solution de Problémes de Structure en Chemie.

Section 3 : Organic Chemistry

FRIDAY, JULY 18, 09.00-12.30.

Hon. President: Prof. Paul Karrer (Switzerland).

General Organic Chemistry: S. ISRAELAS-WILI (Palestine), Diaryl-ethylenes and -Butadienes; K. BALENOVIC (Jugoslavia), On the Formation of Dehydracetic Acids and Analogous Compounds through the Oxidation of -Tetraketones with Lead Tetra-acetate; G. MALCOM DYSON, A New System of Notation for Organic Compounds; V. PRELOG (Switzerland), Constellation of Many-membered Ring Ketones; L. RUZICKA and O. JEGER (Switzerland), a-Amyrine; J. D. ROSE, Reactions of the Aliphatic Nitro Compounds; V. DEULOFEU and E. R. de LABRIOLA (Argentine), Benzoylated Nitriles of Aldonic Acids; Degradation According to Wohl and Zemplen Methods.

SATURDAY, JULY 19, 09.00-12.30.

Chemistry Of Antibiotics: J. F. GROVE, The Chemistry of Gladiolic Acid an Antibiotic Produced by *Penicillium gladioli*; K. FOLKERS, and D. CROWFOOT HODGKIN (U.S.A.), The X-Ray Determination of the Structure of the Penicillin Molecule; V. du VIGNEAUD (U.S.A.), Synthetic Penicillin; Sir IAN HEILBRON, A. H. COOK, J. A. ELVIDGE HARRIS and A. R. GRAHAM, New Approaches to Synthetic Penicillins; W. R. BOON, H. C. CARRINGTON, W. G. M. JONES, G. R. RAMAGE and W. S. WARING, The Chemistry of some 5-Alkoxyoxazoles in Relation to an Attempted Synthesis of Penicillin; K. FOLKERS (U.S.A.), The Chemistry of Streptomycin.

MONDAY, JULY 21, 09.00-12.30.

Heterocyclic Chemistry: J. REILLY, J. P. TEEGAN (Eire), The Diazo Reaction in the Tetrazole Ring; Stig. E. VIEBEL (Denmark), Identification of 5- and 3-Pyrazolones by Potentiometric Titration; Sir ROBERT ROBINSON, Neostrychnine and Pseudostrychnine; M. JANOT and R. GOUTAREL (France), Deshydrogenation Selenique des Alcaloides due *Pseudocinchona Africana* (Rubiacees); F. H. S. CURD and F. L. ROSE, Therapeutic Agents Based on Pyrimidine Synthetic Methods; F. S. SPRING, A New Synthesis of Xanthene Derivatives; Mme. P. RAMART-LUCAS (France), Deformation des Orbites Electroniques du Carbone et de l'Azote, par Effet Sterique et par Cyclisation, dans les Corps Organiques.

TUESDAY, JULY 22, 09.00-12.30.

(Jointly with Section 7.)

Vitamins, Growth Factors and Related Substances: A. COHEN, A Synthesis of Pyridoxin and Related Compounds; L. J. HARRIS, L. W. MAPSON, L. KODICEK, T. MOORE and V. H. BOOTH, Chemical Methods for Estimation of Vitamins; A. R. TODD (—); E. R. H. JONES, H. B. HENBEST and M. C. WHITING, Synthesis of Compounds Related to the Auxins; D. A. van DORP and J. F. ARENS (Holland), Relationship between Structure and Biological Activity in the Vitamin A Group; Pl. A. PLATTNER (Switzerland), D-Homotestosterone; C. W. SHOPPEE, A Direct

(*Continued on page* 840)

FRENCH VEGETABLE OILS

Scope for Increased Production

FRANCE could supplement her annual supply of oilseeds, for which she is at present largely dependent upon her colonies, by 100,000 tons of home produced seeds and nuts by improving cultural methods and making the cultivation of oleaginous plants more profitable to French farmers. Many French soils are favourable. These are the principal conclusions reached in the detailed review of potential oil crops by M. Choppin de Janvry, published in *Oleagineux*.

Already, under the Monnet Plan, farmers have been given some market guarantees. Rape is the principal oilseed crop in France, giving the highest yield of oil per acre. This refers to winter rape, sown in autumn and harvested in the following summer. The so-called spring rape is of little account as a source of oil. Winter rape usually covers some 80 per cent of the total acreage devoted to grain crops. Another form of rape known in France as *la navette*, is also extensively grown.

Other oil-bearing plants in France, described by M. Choppin de Janvry include the black, white, and wild mustard, cameline or German sesame (*Camelina sativa*), oeillette, linseed, sunflower, soya, castor, and one or two others. Grape-seeds are also a considerable source of home-produced oil. It is pointed out that with some of these, considerable increase in acreage, with their proper place in crop rotation, should prove of great advantage to the farmers. The sunflower, for example, yielded 20,000 tons of oil in 1943, but has since declined, and this is much to be regretted. It is one of the most valuable of oilseeds, yielding fodder as well as oil. The soil in many parts of France is eminently suited for its intensive culture. Increasing attention is also being given to soya bean cultivation. Olive oil production in France does not now exceed 1500 tons annually, and here also there is scope for considerable increase by improved cultural methods. An encouraging factor in all these schemes is that a ready and profitable market is assured for a period of years at least.

Official Notices

Fluorine in Food

THE Minister of Food has made the Fluorine in Food Order, 1947, which specifies the permissible limits for the fluorine content of acidic phosphates which are used in the manufacture of food; separate limits are prescribed for the fluorine content of such foods as baking powder and self-raising flour which contains acidic phosphates. Acidic phosphates are one of the major ingredients employed for aerating purposes in self-raising flour, baking powder and the like.

Tung Oil Price Reductions

The Board of Trade announce that as from July 1, 1947, the selling price of tung oil will be reduced from £275 per ton to £250 per ton net, ex store. This price will apply to all sales contracts issued on or after July 1, 1947.

Atomic Plant "Obsolete."—Half of the plant and equipment of the United States Atomic Energy Commission is obsolete because of "startling improvements in processes," the Commission's general manager, Mr. Caroll Wilson, has told the House of Representatives Appropriations Committee. 10 or 15 years would elapse, he said, before atomic power would be used commercially in America.

LETTER TO THE EDITOR

Chlorinated Rubber

DEAR SIR,—On p. 707 of your issue for May 31, 1947, there is a short article on "Chlorinated Rubber," which commences by stating that "The laundry department in most institutional and similar establishments gives an intensely wet and generally corrosive atmosphere, which is apt to play havoc with steel-work, plant and other equipment, in addition to causing the serious trouble of iron stains."

I am afraid that this statement completely misrepresents the conditions which obtain in a modern laundry, where little difficulty is experienced in connection with corrosion of steel work and plant, nor does serious trouble due to iron stains arise.

We do not doubt the value of "D.M.U." as a protective coating, as we have had some experience of it ourselves, but we do feel that the reasons given why "D.M.U." should be used in laundries are, to say the least, somewhat exaggerated.—Yours truly,

F. COURTNEY HARWOOD,
Director of Research.
British Launderers' Research Association.
The Laboratories,
Hill View Gardens,
Hendon, N.W.4.

According to a report by the Bureau of Mines, mine production of lead in Utah last year totalled 27,300 tons, the lowest level reported in recent years. Production in 1945 aggregated 40,817 tons.

THE ROYAL INSTITUTE OF CHEMISTRY

APRIL EXAMINATIONS

THE Royal Institute of Chemistry announces that the following have passed the April examinations:

Associateship in General Chemistry

H. Aldous, B.Sc.(Lond.), Northern Polytechnic, London; M. G. Ashley, University and College of Technology, Leeds and Central Technical College, Birmingham; A. B. Bentley, Central Technical College, Birmingham; A. Bernstein, B.Sc.(Lond.), Northern Polytechnic and West Ham Municipal College, London; J. R. Bickerton, College of Technology, Manchester, and Royal Technical College, Salford; E. Bowes, City Technical College, Liverpool; J. A. Bulley, University College, Exeter; J. S. Chapman, University College, Nottingham, and Technical College, Derby; D. W. Clarke, West Ham Municipal College, London; R. E. Coulson, Merchant Venturers' Technical College, Bristol; F. Crowder, College of Technology, Manchester, and Battersea Polytechnic, London; T. Edmondson, College of Technology, Manchester, and Wigan and District Mining and Technical College; R. W. M. D'Eye, B.Sc.(Lond.), Northern Polytechnic, London; J. A. Gascoyne, B.Sc. (Lond.), Central Technical College, Birmingham; J. Gumb, Technical College, Chesterfield; M. J. Hagger, B.Sc.(Lond), S.E. Essex Technical College, Dagenham; B. L. Hampson, The Polytechnic, Regent Street, London; F. J. Harris, Central Technical College, Birmingham; W. F. Holleyman, Battersea Polytechnic, London; J. T. Hughes, Sir John Cass Technical Institute, London, Technical College, Paisley, Royal Technical College, Glasgow and Woolwich Polytechnic; T. I. Kyle, Heriot-Watt College, Edinburgh; K. G. Langley, B.Sc.(Lond.), Imperial College and Northern Polytechnic, London; Miss E. Martin, Stockport College for Further Education; G. O. Moxley, Municipal Technical College, Hull; D. S. Pillinger, Merchant Venturers' Technical College, Bristol; S. A. Reed, Municipal Technical College, Hull; C. J. Riley, B.Sc. (Lond.), S.E. Essex Technical College, Dagenham; G. A. N. Robinson, B.Sc. (Lond.), Woolwich Polytechnic; J. Robinson, Municipal Technical College, Hull; A. E. Sawyer, Municipal Technical College, Widnes; R. P. W. Scott, Woolwich Polytechnic; R. Sidlow, City Technical College, Liverpool; S. J. Silk, Central Technical College, Birmingham; J. P. Sleight, University College and Municipal Technical College, Hull; Miss M. G. Stephenson, B.Sc. (Lond.), University College, London, Bridgend Mining and Technical Institute and the Polytechnic, Regent Street, London; F. W. J. Teale, University and Central Technical College, Birmingham; S. A. M. Thompson, Storey Institute, Lancaster, Harris Institute, Preston, and Bristol University; A. Thornton, Royal Technical College, Salford; K. S. Vernon, College of Technology, Manchester; H. T. Williams, Royal Technical College, Glasgow; S. Williams, Denbighshire Technical Institute, Wrexham; J. C. Wray, University College, Hull.

Fellowship

Organic Chemistry: D. R. W. Felstead.

Organic Chemistry, with special reference to High Polymers: J. E. Duddington.

Organic Chemistry, with special reference to Oils and Fats: K. V. Bloomfield, B.Sc. (Lond.).

The Chemistry, Including Microscopy, of Food and Drugs and of Water: Miss L. M. Chamberlain, B.Sc.(Lond.); B. A. Forder, B.Sc.(Lond.); A. E. Kerr, B.Sc.(Lond.); J. H. Mallows; D. Pearson, B.Sc.(Lond.); M. G. Read, B.Sc.(Lond.); E. A. Williams, B.Sc.(Birm.).

Agricultural Chemistry: E. Pawson, B.Sc.(Lond.).

General Analytical Chemistry: P. I. Brewer, B.Sc.(Lond.); P. H. Daniels; K. S. McManus.

Special Examination in Textile Chemistry with particular reference to Cotton: L. W. Oldham.

Atomic Research in Canada

Canada "has the opportunity to stand in the front rank of atomic research," Dr. D. A. Keys, of Chalk River, Ontario, vice-president of the National Research Council told the Chemical Institute of Canada at Hamilton, Ontario. "We are the only country outside the United States which has an atomic pile," stated Dr. Keys. "It has the latest instruments and offers opportunities of doing special kinds of research which no other pile in the world has." He spoke of the virtually "limitless" field of the future applications of the products of nuclear fission; radioactive tracers, whose path can be followed inside the body had opened up endless possibilities in botany, medicine, biology, metallurgy and industry.

American Chemical Notebook

From Our New York Correspondent

IN the face of rising requests for isotopes from some twenty nations, the United States Atomic Energy Commission has taken the stand that exports can not be made until production more nearly satisfies American demands and until complex legal problems are worked out. Thus far, some ninety isotopes have been produced and according to Dr. Paul C. Aebersold, chief of the Isotopes Branch at Oak Ridge, Tenn., forty-four of the ninety had been produced in the ten months that the programme had been underway up to May 31. Requests for isotopes, as yet unfulfilled, have been received by the Atomic Energy Commission from the following countries: Argentina, Australia, Belgium, Bolivia, Brazil, Canada, Chile, Cuba, Great Britain, France, Holland, Iceland, Mexico, New Zealand, Peru, Portugal, Russia, Spain, Sweden and Switzerland.

Meanwhile, the Federation of Atomic Scientists, many of whose members worked on the atomic bomb project, has urged the Commission to make non-military by-products of atomic energy available to responsible scientists throughout the world. The federation has specifically requested an allocation of some Carbon 14 for the Curie Laboratory in Paris, and has pointed out, that by sending this and other radio-active isotopes abroad, the United States would offset to some extent "the ill feeling which restrictions upon science in this country have engendered abroad."

* * *

The reduction in the price of polythene is the fourth reduction made by Du Pont since beginning commercial manufacture of the plastic material in 1943. Uncompounded moulding powder, with no colouring, has been reduced from 53 cents to 50 cents a lb. Polythene moulding powder, compounded in standard colours, has been reduced from 63 cents to 56 cents a lb. The price of polythene as first introduced by the company in 1943 was $1 a lb. Since then, there has never been a time when demand has not exceeded production but prices have been steadily reduced. Production has been continuously increased in an effort to keep up with this demand, but the versatile character of the plastics has brought about many new uses for it.

* * *

The Senate Banking Committee has authorised the Reconstruction Finance Corporation to continue its operation of U.S. Government-owned tin smelter at Texas City, Texas, until June 30, 1949. The tin smelter, the only such plant in the United States, happily escaped serious damage in the explosion of ammonium nitrate last April.

Production of inorganic chemicals in the United States in the month of April declined slightly from the high levels of recent months, according to the U.S. Bureau of the Census. Of 35 chemicals surveyed, 24 were produced in lesser quantity in April than in March, although the production of only 11 fell below the output of April last year. The largest decreases from March to April were sulphuric acid, 65,790 tons; soda ash (ammonia soda process), 15,906 tons; and caustic soda (electrolytic process), and chlorine gas, 11,482 tons and 8005 tons respectively. Production of the nitrogenous chemicals declined in varying amounts, ranging up to 10 per cent for synthetic ammonium sulphate. Phosphatic materials fell off generally, with the 16 per cent drop in acid produced from phosphate rock the most significant.

* * *

Although steel companies' earnings improved in 1946, after four years of decline, they were only the third best of the past ten years, according to reports from 51 companies accounting for approximately 91 per cent of the industry's production of steel ingots. Earnings totalled $264,419,213 after deducting all charges except payment of dividends, were 19 per cent lower than in 1941 and 6 per cent lower than in 1940, according to the American Iron and Steel Institute. On their investment, the steel companies earned 6.3 per cent in 1946 and earnings on sales were 5.5 per cent. One factor in the higher net income in 1946 was the fact that charges for the amortisation of emergency facilities, which were heavy during the war, became negligible. In 1945, $156,399,180 was charged for amortisation of emergency facilities while in 1946 only $1,560,483 was charged for this purpose.

* * *

Processes developed at the Bitterfeld plant of I.G. Farbenindustrie, which included the use of by-product sulphur as the reducing agent for chrome oxide, affected economies in the production of chrome oxide and potassium dichromate, the latter being used as an oxidising agent in the preparation of anthraquinone, aniline dyes, chrome pigments, and chrome alum. In chrome tanning and production, costs were kept down through full utilisation of all by-products. Both large and small crystals of potassium dichromate were produced by oxidising a slurry of chrome ore in a kiln. The impure solution of potassium chromate made by extraction with water was then purified, filtered and evaporated, after which the impure chromate salt was redissolved in water and converted to the dichromate by treatment with carbon dioxide under pressure.

LARGE-SCALE PRODUCTION OF OXYGEN—III*

Economic Aspects

by DAVID D. HOWAT, B.Sc., Ph.D., F.R.I.C., A.M.I.Chem.E.

POWER consumption is the dominating factor in the economics of oxygen production. Of the subsidiary factors the percentage recovery of the oxygen is most important. As power consumption is related almost entirely to the work done on the initial intake of air, reduction in the yield of oxygen will reflect seriously on the power consumption values. In its turn the yield of oxygen is closely connected with the correct balancing of the relative percentages of air between the main low-pressure and the subsidiary high-pressure cycles.

Disparate Results

Clark[5] states that the minimum theoretical energy requirement for the separation of cu. m. of oxygen from air is 0.075 kWh or 2.12 kWh per 1000 cu. ft. According to the published data, the Linde Company claimed that the power consumption in the production of 98 per cent oxygen is 0.445 kWh per cu. m. or 12.6 kWh per 1000 cu. ft. Some doubt existed about these claims in Germany, the Lurgi Company employing the figure of 0.72 kWh per cu. m. (20.4 kWh per 1000 cu. ft.) when preparing estimates for new plants in 1942. Clark[5] has collected all the available data on the comparative energy requirements of a number of important Linde-Frankl installations and these are shown in the following table:

COMPARATIVE ENERGY REQUIREMENTS OF LINDE-FRANKL INSTALLATIONS.

Location of Plant	Number of units	Rated capacity per unit (cu. m. of 100 per cent oxygen per hour)	Purity of oxygen (in per cent)	Energy Consumptions kWh per cu. m. of 100 per cent oxygen	Energy Consumptions kWh per 1000 cu. m. 100 per cent oxygen
Leuna	2	2,000	98	0.64/0.68	18.1/19.2
	7	2,800	98	0.64/0.68	19.1/19.2
Bohlen (Brabag)	5	2,300	98	0.75	20.9
Bohlen (A.S.W.)	2	1,000	95	0.98/1.09	27.4/30.8
	2	2,000	95	0.98/1.09	27.4/30.8
Zeitz	6	3,000	98.7	0.70/0.74	19.8/20.6
Lutzkendorf	3	4,000	—	0.68	19.2

From this data it is evident that energy requirements are considerably higher than those claimed by the Linde Company, power consumption even at the most efficient large-scale plant being 18 kWh per 1000 cu. ft. or 40 per cent greater than the Linde Company's figure. Clark[5] estimates that the average consumption should be taken at 0.70 kWh per cu. m. or almost 20 kWh per 1000 cu. ft.

From a series of calculations Clark[5] deduces that the variations in the energy consumption in the different plants listed in the table shown below may be attributed almost entirely to variations in the behaviour of the turbo-compressors operating on the main air intake. If these turbo-compressors may be made to work with an overall efficiency of 60 per cent in compression the energy requirements for oxygen production would in every case be approximately 0.60 kWh per cu. m. or 17 kWh per 1000 cu. ft.

Estimated Costs

In Germany, the usual allocation of manufacturing costs for oxygen, based upon a power consumption of about 0.5 kWh per cu. m., was as follows:

Cost Item	Per cent of total
Electric power	50
Amortisation and interest at 5 per cent ...	40
Labour and other costs	10

If the figure of 18 to 29 kWh per 1000 cu. ft. of oxygen produced is taken as representing good practice in large-scale plants, then the electric power cost at present rates in this country (0.66d. per kWh) will be about 1s. per 1000 cu. ft. On the German estimates this would involve a manufacturing cost of about 2s. per 1000 cu. ft. of oxygen.

On the other hand, it is believed that some of the large American manufacturers are in favour of a high-pressure steam drive for the compressors and at current rates in this country (about 8s. per ton of steam) the high-pressure steam power cost works out at about 8d. per 1000 cu. ft. This figure, in turn, involves a manufacturing cost of about 1s. 4d. per 1000 cu. ft.

The capital cost of these large plants now under construction in the U.S.A. is believed to be about £400,000 for a capacity of 12,000,000 cu. ft. per day. With an as-

* Parts I and II appeared on June 7 and June 14.

sumed depreciation of 10 per cent, this item works out at about 1¼d. per 1000 cu. ft. of oxygen. Allowing an additional 2½d. per 1000 cu. ft. to cover all other manufacturing costs, it appears a reasonable assumption that oxygen could be produced in this country in a very large-scale plant of this type at a total cost of very little more than 1s. per 1000 cu. ft.

The following data, given by Meyer[8], relate to a large-scale plant comprising three units, with an aggregate capacity of 8000 cu. m. of 98 per cent oxygen per hour (283,000 cu. ft. per hour):

Material	Required
Air	45,000 cu. m. per hour.
Lubricating oil	2.4 kg. per hour.
Power	3600 kW. (12.6 kWh./1000 cu. ft.).
Chemicals	1.5 kg. per hour.
Water	160 cu. m. per hour.
Labour	5 men per shift.

Capital cost of plant: 2,000,000 R.M. (£175,000 at 12 R.M. to £1.)

In deriving an approximate manufacturing cost figure from the data given above the following points may be noted: (a) in accordance with the information collected from German sources the figure of 12.6 kWh per 1000 cu. ft. of oxygen is considered to be too low and the estimate is based upon a power consumption of 18 kWh per 1000 cu. ft.; (b) in view of increased prices the capital cost has been estimated at £250,000.

ESTIMATED COST OF MANUFACTURE OF 1,000 CU. FT. OF 98 PER CENT OXYGEN.

Cost Item	Quantities required per 1000 cu. ft. of 98 per cent oxygen	Prices of commodities	Cost (per 1000 cu. ft. of 98 per cent oxygen produced	Per cent of total cost
Chemicals	0.012 lb.	6d. per lb.	0.072d.	0.40
Lubricating oil	0.019 lb.	10/- per gal.	0.30d.	1.66
Water	200 gals.	6d. per 1000 gals.	1.20d.	6.66
Electric power	18 kWh.	0.66d. per kWh.	11.88d.	66.05
Wages	0.007 man-hours	3/6 per man-hour	0.294d.	1.63
Depreciation, Interest, Maintenance	Taken at 15 per cent on capital cost of plant—£250,000		4.23d.	23.55
Total			17.976d.	99.95

Karwat[9] has outlined a scheme proposed by the Linde Company for the production of 80 per cent oxygen to provide the means of enriching the blast to iron blast furnaces. The essential feature of this scheme is the employment of gas engines, fired with blast furnace gas as the source of power for driving the compressors.

Oxygen for Blast Furnaces

The plant is designed for an output of 4430 cu. m. per hour of 80 per cent oxygen (156,379 cu. ft. per hour). The air supply to the oxygen plant is taken from the cold blast main at 1 atmosphere (gauge) pressure and is compressed to 4 atmospheres, while a small proportion is further compressed to 200 atmospheres. As shown in the flow-sheet in Fig. 3, no chemical purification of the high-pressure air is involved. In addition, the lower half of the fractionation tower is replaced by a dephlegmator. As indicated earlier, the dephlegmator is particularly useful for the production of low-purity oxygen.

The 80 per cent oxygen produced is recompressed to 1 atmosphere by a turbo-blower and mixed in the requisite proportions with the preheated blast just before admission through the tuyeres of the blast furnace.

According to the suggested schemes a single gas engine, using blast furnace gas, is employed to drive simultaneously the low-pressure compressor, working on the main air intake and compressing to 4 atmospheres pressure, and also the small high-pressure machine.

Power Consumption

Estimated supplies and requirements are worked out for a plant with an output of 4430 cu. m. per hour of 80 per cent oxygen (or 156,400 cu. ft. per hour). Total power consumption in the gas engines will be: 1914 b.h.p. hour. To generate power in a gas engine supplied with blast furnace gas is estimated to require 2500 K Cals of heating power in the gas per b.h.p. hour.

Assuming a supply of blast furnace gas with a calorific value of: 100 B.Th.U. per cu. ft., 175,700 cu. ft. of blast furnace gas per hour will be required to generate 1914 b.h.p. In heating value, 175,700 cu. ft. of blast furnace gas is equivalent to 175.7 therms.

Even taking blast furnace gas at the relatively high price of 2d. per therm, the total fuel bill for power generation comes only to: £1 9s. 3d. per hour or: 2.26d. per 1000 cu. ft. of 80 per cent oxygen produced.

On the other hand, the capital cost of a gas engine installation of the type required will be high. It is believed that a plant with an output of 156,400 cu. ft. of 80 per cent oxygen must be assumed to cost about £250,000. Taking the figure of 15 per cent of the capital cost to cover depreciation, interest and maintenance, the manufacturing cost under these headings will amount to 7.7d. per 1000 cu. ft. of 80 per cent oxygen produced.

Estimated manufacturing costs for 80 per cent oxygen in a plant equipped with com-

pressors driven directly by gas engines supplied with blast furnace gas have been worked out as follows:

PRODUCTION COSTS OF 80 PER CENT OXYGEN

Capacity of plant ... ... 4430 cu. m. per hour (156,400 cu. ft. per hour.
Power requirements (including compression of the gaseous oxygen produced to 1 atmosphere for feeding to the blast furnace) ... ... 1914 b.h.p./hr.
Blast furnace gas requirements for gas engines (on basis of 2500 Kcals per b.h.p./hr.: assumed C.V. of blast furnace gas, 100 B.Th.U. per cu. ft.) ... ... 175,700 cu. ft. per hour.
Cooling water ... ... 50 cu. m. per hour.
Lubricating oil ... ... 2 Kg. per hour.
Labour ... ... 4 men per shift.

Cost Item	Quantities required per 1000 cu. ft. of 80 per cent oxygen produced	Prices of Commodities	Cost (per 1000 cu. ft.) of 80 per cent oxygen produced	Per cent of total cost
Lubricating oil	0.028 lb.	10/- per gal.	0.42d.	3.48
Water	113 galls.	6d. per 1000 galls.	0.678d.	5.60
Labour	0.025 man-hours	3/6 per man-hour	1.05d.	8.68
Blast furnace gas for power	1120 cu. ft.	2d. per therm	2.26d.	18.66
Maintenance, Depreciation, Interest } Taken at 15 per cent on capital cost of plant—£250,000			7.7d.	63.56
Total			12.108d.	99.98

The outstanding fact of this method of oxygen production is the possibility of reducing manufacturing costs to just about 1s. per 1000 cu. ft. Admittedly the application of this method is restricted to blast furnace plants where a surplus of blast furnace gas is available. Where these conditions exist the possibilities of cheap oxygen production are considerable, particularly if gas engines are employed as the prime movers.

The capital cost of plants involving gas engines is high, both for the actual plant and for the high buildings required to house the installation. The figure of £250,000 assumed for a gas engine plant producing 156,400 cu. ft. of oxygen, is very approximate and may require modification. Nevertheless, the table of costs indicates that the capital costs will account for the major item in manufacturing costs, amounting to more than 50 per cent of the total.

(To be continued)

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CHANGES IN WORLD MINERAL PRODUCTION

IN his presidential address to the Institute of Mining and Metallurgy recently, Professor W. R. Jones drew attention to the fact that 100 years ago Britain was the world's largest producer of copper, lead and tin, whereas to-day her contributions to production of these metals are confined to less than 1 per cent of the world's tin, very little lead, and no copper.

Other points made by Dr. Jones were: There is much anxiety in the U.S. over that country's depleted reserves of lead and zinc. In Australia and Canada there are substantial deposits of these metals, enough in fact "to present a bright picture for some decades."

Tin production in the Belgian Congo has risen spectacularly since 1920, while that in Europe and Australasia has declined. Malayan deposits, though still considerable, are well past their zenith. The Nigerian deposits will be nearly exhausted in 10 to 15 years. In the course of time, the Cornish tin mines may regain their former importance.

Copper deposits in the U.S. will not last more than 30 years, while Chile and N. Rhodesia may become the largest copper producers in future.

Bauxite production now largely confined to British and Dutch Guiana, will tend to become even more restricted in future years.

Canada is the world's biggest producer of platinum and nickel, though recent discoveries of the latter in Brazil may achieve considerable economic importance.

DISTEX HYDROCARBON SEPARATION PROCESS

THE Distex process for the separation of hydrocarbon fractions with nearly the same boiling points—differing only by a degree or two—was described by John Grisworld and co-workers in *Ind. Eng. Chem.*, 1946, *38*, 65 (January) following earlier articles in 1943-4. Its specific application to the case of butadiene/butylene mixtures forms the subject of a patent by Shell Development Co., U.S. 2,350,256 dating from May 30, 1944. The method consists essentially in the continuous introduction of the mixture at an intermediate point in the rectifying column into which is fed at the top a selective and only slightly volatile solvent in which one of the mixture's components is more soluble than the other.

In *La Chim. e l'Ind.*, January, 1947, 10-12, G. Natta, of the Instituto di Chim. Indust. del Politecnico di Milano, states that the American process as described (*loc. cit.*) is the same as that claimed by him in Italian patents Nos. 364,772 (November 12, 1938) and 394,456 (April 20, 1942) and further described in *La Chim. e l'Ind.*, 1942, *24*, 43 and 271. The author has for some years been associated with work on synthetic rubber in Italy, *e.g.*, at the Centro Studi di Chim. ind. del C.N.R. e Instituto per lo Studio della Gomma Sintetica. He says that his method has been industrially applied in 1939 and 1940 at the pilot plant of the Bicocca firm, and in the Ferrara plant (1941) of the S.A. Industria Gomma Sintetica, for the separation of butadiene (b.p. −4.7°C.) from 1-butene (b.p. −6.4°C.).

American Work

In his first Italian patent the process was used mainly in the gaseous phase, while the American work was with liquids at the operating temperature, but this in his view does not constitute any essential difference. In both cases the process is worked at temperatures some tenths of a degree above the boiling points of the pure components to be separated: and in practice solvents are used which boil at least 60°C. above distillation temperature. It is pointed out that, in the American work, numerous experimental data are given relative to the determination of variations in volatility coefficients; but no theoretical basis is presented for calculating the minimum reflux and theoretical plate surface (or E.T.P. = equivalent theoretical plates).

In his paper published in 1942 (*loc. cit.*) Natta gave methods for calculating, either for an isothermic or for an adiabatic process, and introduced a coefficient γ representing the relation between the solubilities α and β of the two gases or vapours in any particular solvent. The inverse of such coefficient γ corresponds in practice to the American coefficient of volatility. Thus also was determined the minimum reflow (riflusso minimo) R_z of the more soluble component introduced at the bottom of the column, and R_f that of the less soluble introduced at the top. Simple equations for such calculation and for determining also Q or quantity of solvent per unit of fraction mixture, are presented, including a brief reference to methods of obtaining butadiene 1-butene, and 2-butene from their respective alcohols.

Further Experiments

In further experiments carried out in collaboration with G. Cardillo, forming the subject of a separate communication, will be shown coefficients $1/\gamma$ greater than unity, other than with methanol, namely: anthracene, phenol, acetic anhydride, aniline, ortho-toluidine, ethylene glycol, furfurol, ethylene chlorhydrin; and values less than unity for several paraffinic and naphthenic hydrocarbons, and for some aliphatic and aromatic chloro-derivatives.

The first laboratory scale separations were made in 1938-9, in collaboration with F. Tetaz, using a column 6 metres high and 34 mm. in diameter, filled with aluminium Raschig rings of 6 × 7 mm. channel surface. The mixture was 90 per cent butadiene and 10 per cent butylene, the velocity of feed 15 lit./hr. of gas and 1.6 lit./hr. of solvent, at 20°C. Separation was complete, yielding pure butylene and 99.5 per cent or more butadiene. If the rate of feed was increased separation was less complete. In the factory scale tests in 1941, using a column filled with much larger Raschig rings, it was noted that—with a column height corresponding to theoretical plate surface—very good results were obtained. This was attributed to the slower rate at which equilibrium was attained between gaseous and liquid phases in the presence of the solvent, at a temperature much less than the b.p. of the latter.

It has thus been possible, for production of Buna S, to apply the I.G. Farben methods of continuous polymerisation to butadiene obtained with alcoholic catalysis. The author in collaboration with M. Baccaredda, is at present engaged in calorimetric experiments with a view to stabilising the relation existing between variations of coefficient γ for different solvents and the difference between the relative heats of solution of the hydrocarbons to be separated.

WAR CHEMICALS FOR INDUSTRY

STOCKS of chemical warfare materials held in this country at the end of the war, of both British and American origin, have presented the Ministry of Supply with no easy problem. Their disposal, however, has proceeded apace, and already 6000 tons have been recovered for industrial use. There have been substantial sales of titanium tetrachloride, and negotiations are proceeding for the sale of chlor-sulphonic acid mixture, though most of the latter is being broken down at Royal Ordnance factories for recovery of sulphuric and hydrochloric acids.

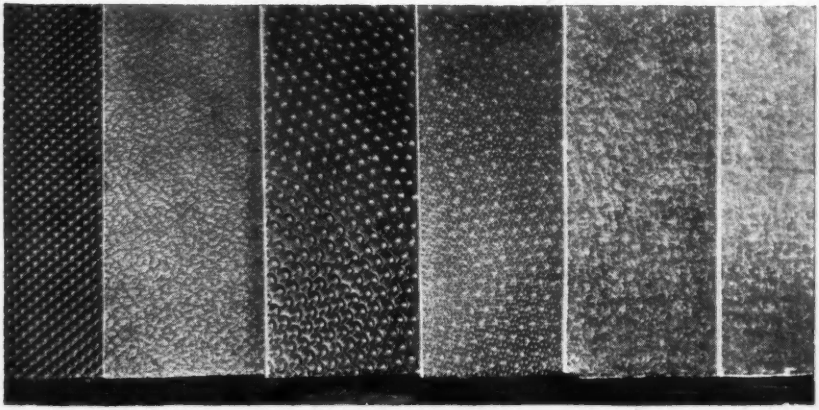
Hexachlorethane/zinc oxide mixture, consisting mainly of varying amounts up to 20 per cent of calcium silicide, 2 per cent potassium nitrate, and the remainder equal parts of hexachlorethane and zinc oxide, has not been found to lend itself to commercial separation into its constituents. Consideration is therefore being given to the possibility of using this material as it stands, or after partial breaking down. Some cyanogen chloride has been sold for industrial use of the filling, while remaining stocks will be sunk at sea.

There are 250 tons of highly toxic diphenylarsinic acid available, which it is thought may be suitable for inclusion in anti-fouling paints and the Ministry of Supply is inviting offers and inquiries from firms who may be interested. Certain flame-thrower fuels will be processed by the Ministry of Fuel and Power for the recovery of motor spirit, while some incendiary compositions (mainly 40 per cent petroleum spirit and 60 per cent heavy coal tar, together with a little lime) are available for purchase.

NEW ACRYLIC RESIN SHEETING

PATTERNED "Lucite" acrylic resin sheeting, a recently-announced new form of the plastic, is now being produced commercially by the Du Pont Company in seven different surface finishes. Virtually any pattern may be applied to clear sheets of "Lucite" through the newly-developed process. The new product complements the original material which is produced with a smooth surface and which boasts sparkling transparency. The patterned form retains the versatile properties for which "Lucite" has been recognised, i.e., strength, shatter-resistance, light weight and rugged endurance.

Costing slightly more than the unpatterned material, the sheets are produced at present in one size, 36 in. by 48 in., and in thicknesses of 0.100 in. and 0.250 in. Range of sizes and thicknesses will be increased as greater production is achieved. The patterned sheets are as easily machined and shaped as the smooth-finished "Lucite." The sheets may be sawed, drilled, polished and otherwise machined by methods similar to those employed in working wood or soft metals. They are readily formed by the application of heat and pressure.



Six decorative patterns of the new plastic.

(*Continued from page* 831)

Proof of the Stereochemical Orientation of the Hydroxy Group, Cholesterol and Dehydroiso and Rosterene.

WEDNESDAY, JULY 23, 09.00-12.30.

Theoretical Organic Chemistry: C. K. INGOLD, G. A. BENFORD, R. J. GILLESPIE, D. R. GODDARD, J. GRAHAM, L. D. HUGHES, D. J. MILLEN, E. R. A. PEELING, H. G. POOLE and R. I. REED, Aromatic Nitration; G. F. BLOOMFIELD and R. F. NAYLOR, The Reaction of Olefines with Sulphur and Hydrogen Sulphide; W. A. WATERS, Mechanisms of Oxidation; J. P. WIBAUT (Holland), Influence of Temperature and Catalysts on Aromatic Substitutions; G. EGLOFF (U.S.A.), The Mechanism of Paraffin Alkylation; M. S. KHARASCH, E. V. JENSON and W. H. URRY (U.S.A.), The Addition of Halogenated Organic Compounds to Olefines; C. MENTZER and DAT XUONG (France), Sur le Mechanisme de la Synthese des Cetones Aromatiques selon Friedal and Crafts.

Section 9 : Fuel, Power and Transport

FRIDAY, JULY 18, 09.00-12.30.

Hon. President: Dr. H. H. Lowry (U.S.A.).

Liquid Fuels and Other Products from Petroleum and Coal: F. H. GARNER, Opening Paper; E. V. MURPHREE, A. F. KAULAKIS (U.S.A.), The Fluid Solids Technique, Applications in the Petroleum Industry; C. PADOVANI (Italy), Production of Olefins from Mineral Oils; J. A. ORIEL, Developments in Technique in Fuels and Lubricants; D. A. HOWES, H. C. RAMPTON, The Properties of Hydrocarbon Fuel for Gas Turbines; S. R. CRAXFORD, The Chemistry of the Fischer-Tropsch Process; G. EGLOFF, Petroleum and Coal as Source Materials for Chemical Derivatives; W. IDRIS JONES, Coal-in-Oil Suspensions; A. R. LEE, The Properties of Tar and Bitumens in Relation to their Use in Road Construction.

SATURDAY, JULY 19, 09.00-12.30.

SIR ERNEST SMITH, The Training of Chemists for the Fuel Industries; A. E. DUNSTAN (To open the discussion); G. W. HIMUS (To close the discussion).

MONDAY, JULY 21, 09.00-12.30.

Characteristics of Solid Fuels: A. PARKER, Opening Paper; D. W. J. KREULEN (Holland), Some Experiments on Humic Acids in Relation to Coalification and Constitution; H. L. RILEY, The X-Ray Crystallography of Bituminous Coal; A. C. MARIES, The Chemist and Coal Conservation: an Outline of the Work of the Fuel Research Coal Survey; STACEY G. WARD, Complex Oxidation Products of Coal; L. HORTON and R. B. RANDALL, The Occurrence of Sulphur and Nitrogen in Coal.

TUESDAY, JULY 22, 09.00-12.30.

Carbonisation and Gasification: J. G. KING, Opening Paper; P. DEMART (Belgium), The Chemistry of Underground Gasification; M. PRETTRE (France), Mechanism of the Reactions in the Producer; R. H. GRIFFITH and G. U. HOPTON, Removal of Hydrogen Sulphide from Fuel Gases; K. W. SYKES, The Reactions of the Steam-Carbon System; E. T. WILKINS and L. J. JOLLEY, The Catalytic Production of Methane.

WEDNESDAY, JULY 23, 09.00-12.30.

Combustion: D. T. A. TOWNEND, Opening Paper; B. LEWIS and G. von ELBE (U.S.A.), Minimum Spark Energy for Ignition of Explosive Gases and its Significance in Flame Propagation; J. I. YELLOT and C. P. KETTCAMP (U.S.A.), Combustion Gas Turbine; H. van DRIEL, P. L. KOOIJMAN and G. H. REMAN (Holland), Preflame Reactions in Hydrocarbon Mixtures; G. WHITTINGHAM, The Formation of Sulphate Deposits and Acid Condensates During Combustion; A. G. GAYDON, Low-Pressure Flames.

Section 11 : Elastomers, Plastics, Glass and Ceramics

FRIDAY, JULY 18, 09.00-12.30.

Hon. President: Prof. O. Dony-Henault (Belgium).

Professor HARRY MOORE, Introduction; Dr. A. SILVERMAN, Some Recent Developments in American Glass Manufacture, 1939-1947; N. N. T. SAMARAS and F. R. J. SCHATZ, Plastics Progress 1939-1947, etc.

SATURDAY, JULY 19, 09.00-12.30.

(Joint Meeting with Sections 2 *and* 10.)

G. B. B. M. SUTHERLAND, The Application of Infra-Red Methods to the Study of Polymers; H. W. THOMPSON, The Study of Polymers and Macromolecules by Infra-Red Spectroscopy; H. COLE, Structural Effects on Colours in Glass.

MONDAY, JULY 21, 09.00-12.30.

Elastomers and Plastics: M. W. PHILPOTT, Control of the Plasticity of Natural Rubber by Chemical Agents; Dr. D. FAULKNER, Plasticiser Action and Chemical Constitution; Dr. E. HOUWINK, Dissolving, Swelling and Plasticising of Polymers; Professor R. M. BARRER, Rate Processes and Equilibria Involving High Polymers; Professor R. G. W. NORRISH, Friedel-Crafts Catalysts in Polymerisation, Kinetic Measurements and the Rôle of Water; Dr. G. GEE, Crystallisation of High Polymers and its Effect on their Mechanical Properties.

Glass and Ceramics: Dr. R. E. BASTICK,

The Colour of Heavy Flint Glasses; J. E. STANWORTH, Very Soft and Very Hard Alkali-free Glasses; etc.

TUESDAY, JULY 22, 09.00-12.30.

Dr. LE BRAS and Dr. DELALANDE, Reactions Between Rubber and Unsaturated Compounds; Professor H. van EULER, Some Aspects of Plastics; Dr. C. A. REDFARN, The Possibility of Hydroxyl Reaction in Phenolic Resin Formation; Dr. G. E. LITTLE and Dr. K. W. PEPPER, Cold Setting Adhesives Prepared from Formaldehyde and Various Phenols; V. E. YARSLEY, Modern Trends in the Application of Plastics; Dr. A. COLIN-RUSS, The Chemistry of Leather-Resinoid as a New Plastics Material.

Section 12 : Metals

FRIDAY, JULY 18, 09.00-12.30.

Hon. President: Prof. Louis Hackspill (France).

Physico-Chemical Properties in Relation to Metal Production: H. J. T. ELLINGHAM, The Scope of Metallurgical Extraction Processes; S. E. WOODS, The Role of Gaseous Diffusion in Metallurgical Processes; J. LUMSDEN, Thermodynamic Properties of the System Zinc-Cadmium; F. TROMBE, Metallic Disprosium and its Magnetic Properties; H. P. DESHPANDE (India), Ancient Indian Metallurgy.

SATURDAY, JULY 19, 09.00-12.30.

Corrosion: U. R. EVANS, Experimental Evidence of the Electrochemical Mechanism of Corrosion; J. BESSON, Method Simplifee Pour l'Etude Potentiometrique de l'Oxydation Superficielle d'un Metal on d'un Oxyde Metallique; F. A. CHAMPION, The Natural Formation of Protective Films on Aluminium and its Alloys; E. S. HEDGES (U.K.), Tin as a Protective Coating on Steel; W. H. J. VERNON, The Function of Surface Films in the Prevention of Corrosion; A. CHRETIEN and J. BROGLIN, The Action of Sulphurous Gas on Pure Iron; M. R. DUBRISAY, Corrosion des Metaux par les Liquides Organique.

MONDAY, JULY 21, 09.00-12.30.

Electro-Deposition: E. A. OLLARD, Modern Developments in Electro-deposition; E. R. DOBBS, Electro-deposited Anti-corrosion Coatings; R. PIONTELLI (Italy), The Electro-chemical Behaviour of Metals; R. PIONTELLI (Italy), The Autodeposition of Lead; M. KARSULIN and B. LOVRECEK, Periodic Dissolution of Lead in Chromic Acid.

TUESDAY, JULY 22, 09.00-12.30.

Alloy Constitution and Behaviour: M. COOKE, The Effect of Alloying Elements in Brasses; F. HALLA and G. FITZER, The Occurrence of Columnar Crystals and of Supersaturation in the Diffusion of Metals with a Transformation Point; F. HALLA, L. EGARTNER and R. S. WEIL, Enhanced Deposition of Metals Through the Formation of Solid Solutions; G. M. SCHWAB, Catalysis and the Strength of Alloys.

WEDNESDAY, JULY 23, 09.00-12.30.

Analysis and General: SMITH, Spectrographic Analysis of Copper with Constant Current Arc; C. H. R. GENTRY, L. G. SHERRINGTON, The Analysis of Refractory Metals; T. G. PEARSON, Recent Progress in the Quantitative Analysis of Aluminium and its Alloys; R. PRIBIL, The Determination of Copper, Arsenic and Antimony in Castings.

Section 13 : Chemical Engineering

FRIDAY, JULY 18, 09.30-12.30.

Hon. President: Prof. José Piazza (Switzerland).

Symposium on Chemical Engineering Education: W. M. CUMMING and F. RUMFORD, Practical Training in Chemical Engineering; C. M. AUTY, Education for Chemical Plant Design; A. GUYER (Switzerland), Chemical Engineering Education in Switzerland.

SATURDAY, JULY 19, 09.30-12.30.

A. T. GRISENTHWAITE, The Production and Purification of Hydrogen by the Water Gas Catalytic Process; J. H. G. PLANT, The Catalytic Removal of Organic Sulphur from Fuel Gases; M. RUHEMANN, Large-scale Oxygen Production.

MONDAY, JULY 21, 09.30-12.30.

R. S. ARIES (U.S.A.), Manufacture of Ethanol from Ethylene; D. F. OTHMER (U.S.A.), Production of Ethyl Alcohol in the United States from Sulphite Waste Liquors and by the Hydrolysis of Wood Waste; W. J. CHADDER and H. M. SPIERS, Developments in Batch Distillation and Pure Toluene Production; BARTOLOMEO ORSONI (Italy), Preconcentration of Heavy Water in Water Electrolysis Plants.

TUESDAY, JULY 22, 09.30-12.30.

G. A. DUMMETT and J. MATTHEWS, Some Applications of Chemical Engineering in the Milk Industry; B. N. REAVELL and G. H. BLACK, The Relationship of the Chemical Engineering Industry to the Iron and Steel Industry; L. S. YOXALL, The Application of Automatic Process Control in the Chemical Industry; F. TREDICI (Italy), Calculation of a Particular case of Intermittently Operating Heat Exchanger.

WEDNESDAY, JULY 23, 09.30-12.30.

R. H. DODD (U.S.A.), Process Design

New Measuring Devices

Effective Applications of the X-Ray Principle

A COMPREHENSIVE review of the remarkable technical advances that have been made in scientific instruments, of which measuring devices reflect most effectively the degree of progress which has been achieved, was provided in an address given recently to mechanical engineers in Cleveland, Ohio, by Mr. E. E. Johnson, manager of the engineering apparatus section of the U.S. General Electric Co. Among the brief descriptions of new apparatus he gave were the following :—

A flaw detector has been developed for the continuous inspection of sheet material such as paper, mica, or plastics. It locates small holes, conducting paths, or metallic inclusions in the sheet material. The detector will count minute faults on sheets moving as fast as 300 feet per minute.

An X-ray thickness gauge is nearing completion for measuring continuously the thickness of hot rolled strip steel moving at speeds up to 30 miles per hour. By continuously measuring the thickness of red-hot steel (without making contact with the steel), this equipment allows the steelmaker to control the thickness more accurately, and therefore may promote substantial increase on the speed or rolling.

An X-ray photometer provides the chemist with a precision measuring equipment for the purpose of continuously indicating the content of one solution in another, or the proportion of one gas mixed with another. It is expected that the X-ray photometer will be useful for routine analysis of the ash content of coal without burning the coal, the chlorine content of chlorinated polythene, and for many other routine tests.

Fatigue Tests

The pneumatic-type fatigue tester makes greatly accelerated fatigue tests not only on test specimens of materials but also on completed parts by vibrating them at resonant frequency which requires the lowest power and provides the highest testing speed. It was developed for testing materials and shapes used as buckets for high-speed gas turbines. A special furnace built into this compact machine allows fatigue testing at actual operating temperature for which the parts are designed.

A new torque meter has been developed for measuring torque transmitted by a rotating shaft at speeds of 35,000 revolutions per minute. In this age of jet propulsion and gas turbines, this high speed of torque measurement is becoming increasingly important. The torque measurement is made without absorbing any power.

Thickness Gauge

A thickness gauge for measuring the wall thickness of pipes and tanks from the outside, has been developed. This is expected to facilitate the safeguarding of chemical and petroleum plants because it will permit the determination of wall thickness without shutting down the plant. When the measurement shows that the wall thickness has reached the minimum safe dimension, then —and only then—will it be necessary to make replacements of the corroded or eroded parts of the system. This gauge measures the average thickness over an area of one or more square inches. (It does not detect pits or pin holes).

The General Electric Co. manufactures a de-point measuring device which is used to determine the moisture content of gases. It will detect moisture in as small amounts as 3/10,000 of 1 per cent by volume, and is especially valuable to manufacturers of compressed oxygen, hydrogen, nitrogen and other gases.

Another device known as the leak-detector, which is based on the original design of Dr. A. O. Nier, of the University of Minnesota, can detect a leak so small that only one cubic centimeter of helium at atmosphere pressure is passed through the opening in 16 years. It is used to detect, locate and evaluate small leaks in vacuum systems of which there are many in industry.

(*Continued from page* 841)

of Catalytic Reactors; J. C. WOODMALLOCK, E. S. SELLERS and H. KAY, Corrosion Problems in the Petroleum Refining Industry, with Special Reference to Problems Experienced in Operation of Solvent Extraction, Dewaxing and Chemical Treatment Plants; D. F. OTHMER (U.S.A.), Correlating Chemical Engineering Data; M. SIMONETTA (Italy), Calculation Methods for Circulation Pumps of Gases Reacting with a Liquid in Presence of a Solid Catalyst in Suspension.

Other Subjects

Other sections of the Congress notified are: Section 4: Biochemistry; Section 5: Agriculture and Applied Botany; section 6: Applied Zoology and Veterinary Science; Section 7: Food and Nutrition; Section 8: Medicine and Therapeutics; Section 10: Natural and Artificial Textiles; Section 14: Essential Oils, Flavouring Materials and Cosmetics.

ANTI-KNOCK AGENTS IN FUEL OILS

OF the many substances used or suggested for preventing knock or detonation in fuel oils of high octane number, the most commonly used is the well known lead tetra-ethyl; but both nickel carbonyl and iron penta-carbonyl have been recommended. Methods of detection or analysis for the first two are relatively simple and easy. In the case of iron penta-carbonyl, procedure is somewhat more difficult. According to Pascal one of the three following methods may be used:

1. Oxidation by boiling with hydrogen peroxide and determination of iron content.
2. Oxidation with nitric acid and determination of iron content.
3. Use of mercuric chloride, as per the following equation:

$$Fe(CO)_5 + 2HgCl_2 + H_2O = 2HCl + CO_2 + Fe(CO)_4.Hg_2C_2$$

The hydrochloric acid formed is bubbled through silver nitrate solution and the chloride determined. But this is not a very speedy or satisfactory method.

A. Marciante, of the Fiat Research Laboratories, Turin, suggests the use of ultra-violet rays (*La Chim. e l'Ind.*, 1947, 29, 35-6). The iron carbonyl decomposes under the action of light as follows:

$$4Fe(CO)_5 + 3O_2 = 2Fe_2O_3 + 20CO.$$

This decomposition which proceeds very slowly in ordinary daylight is greatly accelerated by the action of ultra-violet rays. It is merely necessary to place a few c.c. of the benzene in a test-tube and expose to the light of a powerful mercury vapour lamp. After a few minutes the test tube is removed and a few drops of nitric acid and of potassium sulpho- or ferro-cyanide are added. A red or blue colour indicates the presence of iron and therefore of the carbonyl.

If a quantitative analysis is required the following method is recommended: 300 c.c. of the petrol (benzene) to be analysed are diluted with 700 c.c. of pure benzene so that the percentage of iron carbonyl ranges from 0.05 to 0.6 per cent 4 c.c. of the benzene thus prepared are diluted further with 50 c.c. of pure benzene and exposed to ultra-violet rays for two hours. The flakes of iron oxide are collected in a Gooch crucible, washed with benzene and dried at 100°C., then dissolved cold in 12 c.c. of nitric acid, and filtered; the filtrate is heated to 55°C., and 10 c.c. of 10 per cent solution potassium sulphocyanide added. The solution is stirred, left to stand for a short time, and cooled in running water. The extinction coefficient is determined by means of a Pulfrich photometer. By using the curve herewith the amount of iron penta-carbonyl in grams or c.c. in a litre of benzene can be at once ascertained.

Testing Refractory Linings

SIMPLIFIED methods of quickly determining the efficiency and economics of various types of refractory linings for industrial furnaces were presented recently at Columbus, O., by J. D. McCullough before the school of industrial gas engineers, sponsored by the American Gas Association. He pointed out that proper selection of furnace refractories is an important factor in stretching the available supply of gas for industrial use. There are three chief ways by which heat losses can occur in industrial furnaces: (1) stack losses; (2) escape of heat through the furnace lining; (3) furnace-lining heat lost on shut-down.

Heat storage capacity increases according to the weight of the brick used for the lining. The amount of heat flowing through the wall is also closely related to the weight of the firebrick. Heat storage and heat flow losses can, therefore, be greatly reduced by using light-weight refractories instead of heavy standard firebrick. Curves and tables can be prepared to show how fuel consumption and furnace-heating-up time can be minimised by reducing the weight of the furnace lining.

By way of illustration, mention was made of a heat-treating furnace operating one shift a day at a temperature of 2000°F. When lined with 9 in. of standard firebricks weighing 8 lb. each, the daily heat loss through storage and conduction through the wall amounted to 27,000 B.Th.U. per ft. When lined with insulating firebrick weighing only 1½ lb. each, the loss was said to be only 4100 B.Th.U. per ft.

Meldola Medal Awards

R. H. Stokes, a physical chemist at the University of Western Australia, and A. W. Johnson, who until recently was a member of the research department, I.C.I. dystuffs division, have each received the award of the Meldola Medal for 1946. The medal is presented by the Society of Maccabeans, on the recommendation of the council of the Royal Institute of Chemistry. Eligible chemists must be of British nationality, be under thirty years of age, and have published research work of outstanding promise. Dr. Johnson, who originally worked under Professor Heilbron on vitamin A and related polythenes, went to I.C.I. in 1942.

A CHEMIST'S BOOKSHELF

The New Plastics. H. R. Simmonds and M. H. Bigelow assisted by J. V. Sherman. New York pp. 320. $4.50.

This book is now being printed for the third time, which gives an idea of its popularity. In the main the book is devoted to the more recent advances in the American plastics field and is not concerned with other developments. However, undoubtedly it will be of use to the British fabricator as well as to the student. It cannot be called a vital book for research chemists on new polymers.

One advantage of "The New Plastics" is that it does not waste paper giving a rehash of information which was stale to the average chemist even before the war. Its main purpose is to cover the developments in the plastics field since 1940 and there is only one chapter out of the twelve devoted to the plastics industry prior to that time. In the silicone field adequate detail is given to the Grignard reaction for preparing silicones but no outline is given of the direct method of preparing these interesting polymers. The suggestion that bouncing putty be used as an inner core for gold balls has, I believe, been proved of little use in this field.

A useful chapter is devoted to synthetic rubbers. This is rather important as to quote a statement in the introduction, "Many people have been led to expect more of plastics than will be forthcoming for many years. Much of the expansion that the industry has enjoyed recently has been due to shortages in other materials rather than to the fact that plastics do the job better or more economically. Plastics are not cheap and in most applications their use is indicated not because of the price per lb., but because of their light weight and ease of fabrication." For the most part synthetic rubbers are cheaper than plastics and if rubber can do the job satisfactorily there is no reason for using plastics.

A further point which must be borne in mind is that improved properties in a high polymer invariably means an increase in cost to the buyers, and the user must ask himself whether such an increase in cost is justified by the increase in physical or chemical properties involved.

This book may be recommended to the user of plastics with the proviso that many of the materials mentioned are not available in the United Kingdom. Students considering taking I.P.I. examinations and chemists engaged in the plastics field are advised to have this book on their shelves.

Economics in One Lesson. By Henry Hazlitt. London: Ernest Benn Ltd., 1947. pp. 224. 6s.

Satiated as we have become in the technical verbiage of fashionable economics, it is indeed refreshing to find an economist writing simple, understandable English. There is no drudgery, no headache in Mr. Henry Hazlitt's *Economics in One Lesson*; it provides a couple of hours of good reading and, strangely enough for a work on economics, intellectual comfort. The Economic Sophisms of Frederic Bastiat, now more than a century old, have provided the framework into which the author has fitted a wealth of modern illustration, but the simple story is just as told by the greatest of all the classical French economists. It might be called "Cause and Effect," "The Second Move" or "Action and Reaction," and it sets out to remind us that when we confer a benefit on Mr. "A", we also impose the cost of it on Mr. "B" or Mr. "C." When the benefit and cost are of equal value the process may be worth while; if for instance the miner is four times better off by quadrupling the price of coal, then the processes, political or otherwise, which have given such results may be generally acceptable. But in most of these movements too little thought and attention is given to "the forgotten man" who is now paying, in both money costs and shortage, far more than the total of the benefits so readily voted to organised sections and classes.

This book should find a ready welcome.

A Practical Course in Agricultural Chemistry. By Frank Knowles and J. Elphin Watkin. London: Macmillan and Co. Ltd. 1947. pp.xi + 216. 12s. 6d.

Agriculture has been shedding its empirical methods for a century and is to-day as dependent upon science as any manual activity in the country. While it is probably true that scientific method has more often than not merely confirmed and elaborated knowledge already conferred by experience, there is no doubt that it has also permitted a greater degree of control

(*Continued on page* 845)

PARLIAMENTARY TOPICS

Shortage of Glassblowers.—Mr. Philips Price asked the Minister of Labour whether he is aware that manufacturers of scientific glassware in this country are losing their skilled glassblowers to firms who are able to offer them high wages, in view of the scope for selling domestic glassware at high prices under present conditions; and whether, in view of the vital importance to this country of an adequate supply of scientic glassware, he will take some remedial action in this matter.—Mr. G. Isaacs: I have no evidence that skilled glassblowers are leaving the scientific glassware industry to any extent. If my hon. friend has particular cases in mind and will let me know I will make further inquiries.

Government Imports.—Replying to Sir W. Smithers, Mr. J. Belcher said that the Government are the sole importers of the following: Starch, citric acid, sulphur, pyrites, phosphate rock, molasses, ethyl alcohol, acetone, acetic acid, acetic anahydride, butyl alcohol, pine oil, tung oil, solid caustic potash, casein, chrome ore, lead, zinc, copper, virgin aluminium, pig-iron and steel.

Dead Sea Magnesium.—Mr. R. Stokes asked the Minister of Supply what quantities of magnesium from the Dead Sea sources of supply have been made available for use in the United Kingdom annually since 1937.—Mr. W. Leonard (Parliamentary Sec.): None.

Carbon Black.—Mr. C. N. Shawcross asked the President of the Board of Trade whether he will take steps to provide for channel black for motor car tyres to be manufactured in the United Kingdom.—Mr. J. W. Belcher (Parliamentary Secretary): An interdepartmental committee is exploring schemes for the production in this country of carbon blacks, suitable for motor car tyres.

Fuel Oil From Russia.—Mr. Philips Price asked the Minister of Fuel whether it is proposed to purchase any fuel oil from the U.S.S.R. in the near future; and what quantities are likely to be imported.—Mr. Shinwell: The U.S.S.R. has offered to supply for consumption in the United Kingdom a quantity of Russian produced black oils including fuel oil, roughly corresponding to Russian Oil Products Limited's share of prewar requirements of the United Kingdom. The offer has been accepted. The quantity of fuel oil involved is not yet known, but will be small.

Civil Service Scientists.—Methods of recruiting scientific staff for research organisations controlled by the Department of Scientific and Industrial Research are slow and cumbersome and do not enable the right men and women to be quickly fitted into the scientific posts for which they are best suited alleged Mr. Philips Price, who asked that the present system should be revised in the interests of the research institutions concerned. Mr. Glenvil Hall (Financial Secretary, Treasury) said that the introduction of the present system of centralised recruitment, in accordance with the White Paper on the Scientific Civil Service, during the difficult period of reconstruction "aggravated the inevitable teething troubles." Close consideration would be given to the experience gained during this period in formulating future recruiting arrangements.

Aluminium Houses.—"Until I have further information on the technical merits of the prototypes, and the probable costs, it is premature to consider production," said the Minister of Health (Mr. A. Bevan) when he was asked by Mr. D. J. Williams in the House of Commons if it is proposed to proceed with the production of aluminium two-storey houses.

No Rumanian Oil.—It has not been possible since the termination of hostilities to purchase any Rumanian oil for this country. This is mainly because of the large proportion of Rumanian oil exports which are absorbed by the U.S.S.R.—The Minister of Fuel.

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of the husbandry factors (excepting the weather!). That is why books such as this command so ready a sale among the increasingly large body who are equipping themselves as scientific agriculturists—who, it may be mentioned in passing, are commonly much more useful persons than "agricultural scientists." "A Practical Course in Agricultural Chemistry" is for the former and, presupposing that the student has a sound elementary grounding in chemistry, concerns itself only with the application of basic principles—largely of quantitative analysis—to soils, manures and fertilisers, feedingstuffs, dairy products and plant biology. In this book the authors elaborate from an essentially practical angle on the agricultural chemical subjects they have taught with distinction at one of our oldest agricultural institutes and have supplemented and modernised the edition which was first published in 1937.

Dr. Robert Woodward, of Harwood University, who a few years ago succeeded in synthesising quinine, has succeeded, it is announced, in producing protein-like molecules which seem to be almost identical with those occurring in nature.

PERSONAL

MR. A. GRUNDY has been appointed a director of Anchor Chemical Co., Ltd.

MR. CLIVE COOKSON, chairman of Goodlass Wall and Lead Industries, is to retire from the board after the forthcoming annual general meeting.

DR. J. H. QUASTEL, F.R.S., director of the Soil Metabolism section, University College, Cardiff, has been appointed professor of biochemistry, McGill University, Montreal.

DR. T. F. WEST, who is the author of papers on DDT, and has recently been appointed an assistant director of the Ontario Research Foundation, will leave London for Canada in July.

SIR ROBERT ROBINSON, president of the Royal Society, opened the new Henderson research laboratory in the department of Chemistry, University of Glasgow, on June 25.

MR. T. MACKENSON has been awarded the highest distinction of the Institute of British Foundrymen, the E. J. Fox gold medal, for services to the foundry industry as secretary of the Institute for 21 years and as war-time Director of Iron Castings at the Ministry of Supply.

DR. DAVID D. HOWAT, senior lecturer in metallurgy at the Royal Technical College, Glasgow, who was recently awarded a Nuffield Foundation Travelling Fellowship in Metallurgy, to cover three months' travel in the United States and Canada, left for New York on June 25.

DR. C. A. THOMAS, executive vice-president and technical director of the Monsanto Chemical Co., has received the medal of the U.S. Industrial Research Institute for "inspiring leadership in the development of the U.S. research system and for thus participating in U.S. chemical enterprise."

DRS. D. G. DAVEY, F. L. ROSE and S. H. S. CURD were last week each awarded the gold medal for therapeutics of the Society of Apothecaries for their preparation of the anti-malarial drug paludrine, which they produced after some 2½ years' research involving 4887 different preparations in the Imperial Chemical Industries' laboratories.

MR. "CHARLIE" JOHNSON, Wakefield office manager of Brotherton and Co., chemical manufacturers, has completed 52 years' service with the firm, and was entertained at lunch on June 16. Among those present were Mr. Stanley F. Mallett (Glasgow manager) 51 years' service; Mr. W. Chadwick Clapham (registrar and assistant secretary), 33 years' service; Mr. L. Weaver (commercial manager), 33 years' service; and Mr. F. Fisher Heath (sales manager), 32 years—a total of 201 years' service by five employees.

PROFESSOR F. H. GARNER, head of the Chemical Engineering Department and Dean of the Faculty of Science in the University of Birmingham, has been awarded the United States Medal of Freedom, with Silver Palm, in recognition of his outstanding contribution to the development of petroleum warfare. He dealt with all aspects of the subject from the early stages of the war and made important developments in the technique of flamethrowing, which were adopted by the U.S.A. Army technicians.

Obituary

MR. P. E. MARMION, a director of Fisons, Ltd., Imperial Smelting Corporation, and other concerns, died on June 10.

DR. J. VELISEK, professor of physical chemistry at Brno Technical College, has died in Czechoslovakia.

The death is announced of PROF. P. W. SCHUTZ, professor of chemical engineering in the University of California. He was 38 years of age.

MR. G. H. TIPPER, who died recently, was director of Mica Control at the Ministry of Supply until October of last year. He was an acknowledged expert on mica from mining to its industrial production and utilisation.

The death has occurred at the age of 76 of MR. THOMAS DOUGLAS, joint managing director of W. J. Robertson & Co., Ltd., Waverley Oil Mills, Edinburgh. Mr. Douglas, who joined the firm in 1898, became managing director in 1919.

I.G. Farben's Canadian Interests

Hon. Colin Gibson, State Secretary, has informed the Canadian House of Commons that there is no evidence that any Canadian firm has failed to report any connection with I.G. Farben, the German chemical octopus now under indictment on charges of holding international cartel agreements. I.G. Farben had interests in only one Canadian (Montreal) concern in which it held 16 per cent of the stock. Mr. Gibson said the indictments against the German firm made no mention of relations with Canadian companies.

He said the office of the custodian of enemy property had records of five patents which stood in the name of I.G. Farbenindustrie. After the outbreak of war, these were licensed for use in Canada by the Commissioner of Patents. Royalties amounting to about $8000 were collected from the Canadian licensees.

The custodian also has knowledge of a contract between a company and I.G. Farben relating to the use of trade marks and technical assistance. All payments under this contract have been made by the Canadian company to the custodian.

Overseas News Items

Metal Powder Association.—An American Metal Powder Association, with offices in New York City, has been founded.

New U.S. Smokeless Fuel Plant.—The Disco Company of Pittsburgh, is to build a low-temperature coal carbonisation plant and tar refinery at Pittsburgh; construction costs will be in the region of $3 millions.

U.S. Bauxite Production.—Following a post-war record bauxite production figure of 311,079 long tons in the third quarter of 1946, there was a decline to 250,662 tons in the fourth quarter, states Bauxite Report No. 4 issued by the U.S. Bureau of Mines.

Oil Refineries for Venezuela.—Creole Petroleum Corporation is to construct two refineries at Amuay Bay for the Shell Company of Venezuela and the Venezuelan Government. Production will commence at the first by August 1950, and at the second by April 1952.

German Scrap Metal.—The Russian Military Government is reported to have issued an order for the collection and removal from the Soviet zone in Germany of two million tons of scrap metal of which 400,000 tons would come from Berlin. Protests have been made on the ground that execution of the order would hamper rehabilitation in Germany.

Sunflower and Peanut Crops.—The 1946-1947 sunflower-seed and peanut crops in Argentina, with last season's production figures in parenthesis, are: Sunflower seed 903,000 metric tons (890,000 tons); peanuts, 115,600 tons (139,100 tons). The production of linseed oil in this Republic during 1946 has been officially recorded at 521,165 metric tons, compared with 487,710 tons in 1945.

Chilean Mining Production.—According to statistics published by the Banco Central de Chile, Chile's 1946 mining production figures compare with those of the previous year as follows: nitrate of soda 1,617,317 tons (1,339,608); copper bars 360,936 tons (470,202); iron-ore 1,158,386 tons (278,877); coal 1,954,063 tons (2,049,822); gold 7169 kilos fine (5885).

Australian Oil Policy.—The Australian Commonwealth Government has decided to rely upon unsubsidised private enterprise to raise the production of commercial oil in the continent. The policy of subsidising commercial operations, it has been stated, has not produced good results. The Government has therefore started its own geophysical survey and scout drilling in co-operation with State authorities and the results will be made available to any interests concerned with the search for oil.

U.S. Silver Prices Drop.—Silver prices on the New York market have dropped to 70 cents an ounce, the lowest since September, 1945.

U.S. Aluminium Output, 1947.—Production of primary aluminium during January amounted to 50,045 short tons, a figure which approximates that for December, 1946.

More Austrian Aluminium.—The Austrian aluminium works at Ranshofen have resumed production. For the past six weeks several of the works' furnaces have been operating. If another 40 furnaces can be put into operation, capacity would increase by 50 per cent.

Swiss Dyestuffs Development.—Leading Swiss chemical firms are supporting the institute for dyestuffs research which is to be set up at Basle in support of the Swiss export drive to obtain a large share of the world market provided by the urgent needs of the textile and leather industries.

Steel for German Industry.—A material contribution to Germany's steel needs, including some high-grade alloys not now being manufactured will be provided by the gradual distribution of war and other material of the Krupp plant at Essen, comprising about a million tons of steel.

Balkan Trade Fair.—Free exhibition space, cheap rail facilities and other inducements are being provided by the organisers of Bulgaria's Plovdiv Industries Fair, the biggest trade fair in the Balkans, August 31-September 14. Chemical and medical supplies, scientific instruments and machinery are among Bulgaria's urgent needs.

Fertiliser Board in Germany.—Since the dissolution of the big German fertiliser concerns in the Soviet zone, distribution has been taken over by the so-called Fertiliser Board. Under the new system of distribution, producers receive certain quantities of fertilisers according to acreage and the varying density of the plants cultivated. Forty kilos of nitrogen, 15 kilos of phosphate and 50 kilos of potash were allotted per hectare of cultivated land.

New U.S. Glass Treatment Process.—The Radio Corporation of America is reported to have developed a new process for the treatment of the surface of glass; it is claimed to reduce reflection by about 90 per cent. It will not be suitable for window glass, however, because the slightest accumulation of dust becomes immediately noticeable. The Pittsburgh Glass Company is expected to carry out further work in connection with the new process.

Re-equipping U.S. Industry.—American business, exclusive of agriculture, expects to spend about $13,900 million during 1947 for the construction of new plant and the purchase of new equipment, according to the quarterly survey by the U.S. Securities and Exchange Commission and the Department of Commerce. It is estimated that American business will spend another $600 million dollars on old or used plant and equipment. Expenditure on new plant and equipment in 1946 was $12,000 million.

New Tanning Process.—The discovery of a new process for treating wattle bark which reduces the time required for tanning with wattle to about six days, has been announced by the director of the Leather Industries Research Institute of Rhodes University College. A large South African tanning company, which had employed the new process for one-half of its total output for several months, has had such satisfactory results that it has decided to use it for its entire output.

Goodrich Expands Again.—Marking the fourth expansion undertaken in Oaks, Pennsylvania, since the company opened its plant here in 1937, the B. F. Goodrich Company has announced that the current plant expansion programme undertaken will cost more than $1,600,000. In each instance, plant expansion has involved costs of more than a $1,000,000. During the past ten years, the plant wage-bill has increased from slightly more than $800,000 annually to the nearly $3,250,000 estimated for 1947.

Australian Aluminium Report.—" So far there has not been discovered in Australia ore of the quality normally used by overseas aluminium producers "—states the first report of the Australian Aluminium Production Commission. The alumina content of Victoria deposits averages 51 per cent, of Tasmania little more than 40 per cent and New South Wales 36 to 39 per cent, compared with the 56 to 62 per cent alumina in the ores generally used in Canada and the U.S.A.

New Solvent.—The Celanese Chemical Corporation, U.S.A., has announced that a new versatile solvent and intermediate, known as Tetrahydrofurane, is now available in experimental amounts and is scheduled for quantity production in the near future. The new solvent is said to be one of the most effective for vinyl compounds and opens up new avenues of approach in terms of specialised solvent activity for the cellulosics, synthetic rubber, alkyd resins and organic chemicals. In addition to solvent applications, potential uses of Tetrahydrofurane are as a chemical intermediate in making adipic and succinic acids, related anhydrides and other important chemicals.

Fatty Acids from Germany?—Full production of fatty acids for soap manufacture by six factories in the Ruhr is being recommended to the Allied Military Government in the proposals of the premiers of the three western zones of Germany for national rehabilitation. This, they suggest, aided by fuller coal production and a more generous allocation of coal to German industry, would enable 50,000 tons of fatty acids to be produced annually, of which 100,000 tons would be available for export.

Western Silesian Industry.—The economy of the former German part of Silesia is reviving. About 450 large industrial plants in the area were destroyed during the war. Some 500 enterprises survived in working order, with a production capacity which is, however, still below the pre-war level. Of the 159 metal works, 39 are now in operation, employing 10,000 men, while the chemical industry is operating with 29 plants, and the timber industry and the paper industry with 33 each.

South African Patents Decision.—South Africa has recently followed the example of other countries in extending until March 21, 1948, the period within which patent applications can be validly filed for inventions for which patent applications have been filed abroad not earlier than September 7, 1938. These benefits are not extended to citizens of countries with which South Africa was at war after September 6, 1939, or to applications made in a country which does not afford reciprocitiy to South African citizens.

Less German Steel and Chemicals.—Temporarily negativing the effect of the Allied agreement to raise the level of German steel production (to 10-12 million tons annually in the Anglo-U.S. zone), several Ruhr iron and steel works have closed, owing to lack of coal, which has also caused cuts in production of chemical plants. This is the first effect of the Ruhr miners' " go-slow " policy, which has resulted in a daily coal production of only 216,000 tons instead of the target figure of 250,000 tons.

Nickel Plating.—Twenty one causes of nickel-plating failures and methods of preventing them are discussed in a monograph published by Office of Technical Services, Department of Commerce, Washington 25, D.C. The report emphasises the harmful effects on nickel plating of organic and metallic impurities in the electrolytes, hydrogen absorption, excessively high or low hydrogen in concentration, excessive concentration of organic acids, and faulty degreasing of the base surfaces. The report includes a bibliography of literature on problems related to the peeling of nickel deposits. Many of the articles cited appeared in British and German trade journals.

Home News Items

Peat Conference.—Plans for the development of peat were considered at a conference (organised by the Scottish Reconstruction Committee) in Glasgow on June 21.

Office Change.—We are informed that the Midland Area Offices of the Rockwell Machine Tool Co., Ltd., are now at 132 Steelhouse Lane, Birmingham, 4. Telephone: Central 3692 and 3693.

Institute of Welding.—The 24th annual report of the council of the Institute of Welding shows that for the first time during the past four years, membership for the year ended March 31, at 4811, showed a decrease on the previous year (5115).

Chemical Society Garden Party.—Fellows of the Chemical Society and members of the Eleventh International Congress of Pure and Applied Chemistry will be entertained by H.M. Government at a garden party on July 17, at Lancaster House.

B.S.I. Cocktail Party.—Sir Clifford Paterson, F.R.S., deputy chairman of the British Standards Institution, and members of the council of the Institution entertained Mr. Howard Coonley, the first president of the International Organisation for Standardisation, at a cocktail party in the new council room of the Institution last week.

Low Coal Production.—Coal production in South Wales in the week ended June 7 was the lowest since the beginning of the five-day week. Output was 481,084 tons, 19,000 tons below the minimum which Mr. Shinwell has said he requires from the district. There are about 2600 more miners than there were at the beginning of the year.

Use of Non-Ferrous Metals.—Total consumption of non-ferrous metals in the first quarter of this year was in all instances, except tin, less than a quarter of the total intake in 1946. Figures issued by the Directorate of Non-Ferrous Metals are: Zinc, 48,701 tons; lead, 42,535 tons; tin, 6663 tons; cadmium, 122 tons; antimony, 1160 tons.

Non-Ferrous Metal Prices.—The outstanding feature of the world shortage of non-ferrous metals was that the U.S.A. had become an importer, said Mr. Walter Gardner, chairman of the Amalgamated Metal Corporation in the course of his annual statement to shareholders last week. There was, he considered, no immediate prospect of relief of the present situation caused by American readiness to pay high prices to satisfy her domestic needs, which was causing difficulties in countries with smaller financial resources.

Technical Literature.—Protolite, Ltd., has issued an interesting 32-page booklet entitled "Instructions for Brazing and Grinding." It is well produced and adequately illustrated.

Steel Worker Killed.—While working in the "breaker feed" at Lancashire Steel Corporation's works at Irlam on June 13, William Dickinson, aged 56, of Scholes, Wigan, was killed by a piece of scrap metal.

Cement Production.—About 500,000 tons are produced annually in this country, as against 531,000 tons in 1939, when annual consumption was a million tons. Last year's consumption figure is estimated at 700,000 tons.

Diminishing Death-roll.—Deaths caused by accidents in coal mines continued to decline in 1946—to 541, against 550 in 1945. Total death roll due to accidents in mines and quarries in Great Britain last year amounted to 588 (1945, 575).

Fewer Unemployed. — Unemployment reached its lowest level for several months during May. On May 12, there were 331,543 registered as wholly unemployed, 95,000 fewer than a month before and nearly 230,000 fewer than at the end of March. During April 10,000 more women entered industry.

Coal Production Figures.—Mr. Shinwell has announced that the provisional estimates of coal production recently given at weekly intervals were subject to margins of error, and were in any case issued only because of public interest in the five-day week. In future, the weekly figures will be given only in the Ministry's monthly press announcement.

Record Order for Dorman Long.—Dorman Long (Africa), Ltd., a subsidiary of Dorman Long, Middlesbrough, has been appointed main contractor for the structural design and steelwork of the new South African Steelworks at Van der Bijl Park, Vereeniging, Transvaal. This is the largest order of its kind placed in Britain since the war and will require some 45,000 tons of steel and will cost over £3 million.

North Cheshire Gasworks.—The Ministry of Fuel and Power has approved the first step in a £3 million scheme planned by the United Kingdom Gas Corporation for reorganising and radically increasing gas production facilities in North Cheshire. A new gasworks, to be erected at Denton, at a cost of £1,250,000, will have a capacity of 6 million cu. ft. of gas a day; it will process 400 tons of coal daily, and will take four years to complete.

Company News

Stream-Line Filters, Ltd., announces a net trading profit for 1946 of £39,269. Distribution of a final dividend of 10 per cent is recommended.

Beechams Pills Ltd., announces a trading profit for 1947 of £2,682,216. A final dividend of 4 per cent is recommended, making a total of 40 per cent for the year.

Griffiths Hughes Proprietories, manufacturing chemists have announced a profit for the year just ended of £153,428, as against the previous year's figure of £151,773. The total ordinary dividend is again 15 per cent.

Cockburn and Company, manufacturing chemists, announce a net profit for the year ended March 31 of £17,771 as compared with £23,158 for the previous year. An ordinary dividend of 20 per cent is being paid.

Johnson Matthey and Company, gold, silver and platinum refiners have announced a profit of £73,900 for the year ended March 31, as compared with last year's figure of £88,500. Dividend is to be maintained at 12 per cent (including a bonus of 6 per cent).

Zinc Corporation is to recommend payment of a final dividend in respect of 1946 of 5s. 6d. per ordinary share of 10s. or per £1 unit of ordinary stock, making a total distribution of 7s. 6d. gross per share or unit. Net profit of £290,000 shows an increase of £163,000 compared with the previous year.

Sangers Limited, manufacturing chemists, has announced a profit of £322,687 for the year ended February 28, 1947. This compares with £266,036 for the previous year. In addition to a final ordinary dividend of 20 per cent, making 30 per cent for the year, it is proposed to distribute a capital profit bonus of 1.2 per cent, free of tax.

The Distillers Company Limited has declared a second interim dividend on the ordinary stock in respect of the 10½-month period ended March 31, 1947, of 2s. 6d. per £ of stock (equal to 12½ per cent actual) less income tax, payable on August 1. The accounts of the subsidiary companies will be completed in time to enable the board, at their meeting on August 28, to give consideration to the amount of a final dividend when a statement of profits and appropriations will also be issued.

New Companies Registered

Foam-Bar, Ltd. (436,503).—Private company. Capital £100 in £1 shares. Manufacturers of and dealers in chemicals, chemical products, soap and washing materials, oils, greases, etc. Subscribers: H. F. Morling and Jas. G. O'Connell. Registered office: 131 Baker Street, W.1.

Corvus, Ltd. (436,486).—Private company. Capital £100 in £1 shares. Manufacturing chemists, etc. Subscribers: Irene V. McCoy-Hill, and Elsie M. Pitt. Irene V. McCoy-Hill is the first director. Registered office: 9 Arundel Street, W.C.2.

Hardy (Refractories) Coal, Aston, Ltd. (434,917).—Private company. Capital £2000 in £1 shares. To acquire the business of manufacturer of laboratory, combustion, refractory boat and laboratory refractories carried on by Joseph Hardy at Coal Aston, Derbyshire. Directors: J. Hardy, C. Brown. Registered office: Ockley Farm, Aston, Sheffield.

J. H. Shimwell, Ltd. (436,039).—Private company. Capital £5,000 in £1 shares (2,000 ordinary and 3,000 6 per cent cumulative preference). Wholesale and retail manufacturing chemists, druggists and herbalists, chemical engineers, etc. Directors: S. Shimwell; Lizzie Shimwell, and C. C. Barker. Registered office: 153, The Parade, Watford.

Powell Duffryn Carbon Products, Ltd. (436,830). — Private company. Capital £500,000 in £1 shares. Producers of carbons and materials containing carbon, manufacturers of goods, substances and materials therefrom, etc. Directors: E. L. Hann, H. H. Merrett, R. W. Foot, O.B.E., M.C., H. V. Vale and J. G. Bennett. Registered office: 40 Lime Street, E.C.3.

Culina Products, Ltd. (435,503).—Private company. Capital £2000 in £1 shares. Manufacturing, research, dispensing and analytical chemists and druggists, manufacturers of and dealers in jams, preserves, table delicacies, baking, gravy and other cooking powders, etc. Directors: G. W. Marsden, 37 Dryclough Road, Crossland Moor, Huddersfield, and Kathleen M. Marsden.

Chemical and Allied Stocks and Shares

DESPITE the more hopeful turn in international affairs, stock markets were restrained, sentiment having been influenced by the disappointing coal output figures. British Funds moved lower on balance, but industrial shares, although uncertain, were not without good features, dividend announcements having continued to show a number of increases. New issues again attracted considerable attention and in some cases commanded substantial premiums.

Imperial Chemical showed small fluctuations around 52s. 3d. at which the yield exceeds 3¾ per cent on the basis of last year's

10 per cent dividend, which is generally expected to be at least maintained. The market view is that in due course the £1 units are likely to be "split" into four units of 5s. each. Monsanto Chemicals 5s. units have been less active and eased to 62s. 9d., but among other newcomers, Hardman & Holden 5s. ordinary rose further to 34s. 9d. B. Laporte were again 105s., and W. J. Bush 93s. 9d., with Greeff-Chemicals Holdings 18s. 3d., while helped by the full results Fisons have strengthened to 68s. 3d. The latter company is expected shortly to announce proposals for providing some of the additional capital required for the programme of increased production of fertilisers. The directors are also discussing with the Capital Issues Committee the question of additional capital for Genatosan Trust to finance extensions.

Borax Consolidated firmed up to 60s. 9d., but British Oxygen at 113s. 9d. failed to hold best levels. Turner & Newall were better at 91s., although Lever and Unilever eased to 56s. British Glues & Chemicals 4s. ordinary firmed up to 20s. 9d. in response to higher dividend hopes. United Molasses were firm at 59s. 6d., with British Plaster Board 33s., and Associated Cement 77s. Although not maintaining best levels, the units of the Distillers Co. at 153s. 6d. were higher on balance, the 20 per cent dividend total to date in respect of the accounting period covering ten and a half months being regarded as good. The general assumption is that the final payment, expected in August when consolidated accounts are prepared, will be at least 2½ per cent or 5 per cent. Total payment for the previous year was 22½ per cent.

Iron and steel shares have been steady with United Steel favoured up to 26s. 3d., although Guest Keen and Thomas & Baldwins lost an earlier rise, the tendency being to await the big issue expected to be made by the Steel Company of Wales. Colliery shares, on the other hand, were rather out of favour, recent market "break-up" value estimates having been based on the assumption that following nationalisation of colliery interests leading companies would propose liquidation in due course; some, contrary to market expectations, have announced their intention not to liquidate. Babcock & Wilcox have been good at 79s. There were only minor movements in textile shares and Courtaulds eased to 52s. 3d. Goodlass Wall 10s. ordinary receded to 46s. 6d. following publication of the results. In his statement the chairman of the last-named company states that it will be a good thing for the metal industry and the country when controls and restrictions can be removed, and when the London Metal Exchange is once again allowed to open. Amalgamated Metal shares were 20s, and Imperial Smelting 20s. 6d.

Beechams 2s. 6d. deferred shares eased to 29s. 9d., although the increased dividend was up to best expectations. Griffiths Hughes were 58s. 9d., and Aspro strengthened to 54s. 9d. Glaxo Laboratories were better at 27½, and on rumours that the £1 shares are to be subdivided into four of 5s. each, British Drug Houses touched 67s. 6d. Oils have been featured by Anglo-Iranian which touched the new high level of £9⅛ following news of the big profit increase and the raising of the dividend from 20 per cent to 30 per cent.

British Chemical Prices

Market Reports

ALMOST all sections of the market report a substantial flow of inquiries with the supply position showing no pronounced improvement. Deliveries against existing contracts have been maintained on a satisfactory scale, and the half-yearly interest in replacement bookings has increased to the possibility of price changes. While a relative scarcity is not considered sufficient in itself to raise prices, increased costs of production and a reduced output are factors which might well affect present quotations. Formaldehyde is an active item and supplies of white lead and red lead are fully absorbed, and much the same can be said for all the leading industrial chemicals. The coal tar products market is without feature, a strong demand being reported.

MANCHESTER.—Although the general run of heavy chemicals on the Manchester market has been well maintained during the past week, signs are not wanting of an easier undertone in respect of some of the non-ferrous metal products as a result of the decline in the United States copper market and although prices of the chemicals concerned have not actually been altered so far an early recession after the recent sharp advances would not be surprising. Fresh inquiry for general chemicals has continued on steady lines from home users as well as from shippers and good quantities are going into actual consumption.

GLASGOW.—There have been no noteworthy changes in the Scottish chemical market during the past week. Busy conditions have prevailed and there has been no decline from the improved conditions attained during recent weeks. In the export market a number of orders have again been secured and there is no doubt that when delivery improves there will be a ready market for all classes of chemicals. Inquiries both for home and export markets have been particularly numerous for zinc oxide, calcium chloride, tri-sodium phosphate and di-sodium phosphate.

Patents in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each.

Complete Specifications Open to Public Inspection

Preparation of alkoxy-nitroanilines.—N.V. Polak & Schwartz's Essencefabrieken. Oct. 1, 1942. 20996/45.

Nitriding of high chromium ferrous alloys. Nitralloy Corporation. Nov. 13, 1945. 34164/46.

Unsaturated compounds and polymers thereof.—Pittsburgh Plate Glass Co. Oct. 22, 1942. 19288/43.

Production of unsaturated alcohols.—Shell Development Co. Nov. 13, 1945. 17477/46.

Alpha betadihaloacrylates and polymers.—Wingfoot Corporation. Nov. 19, 1945. 7109/46.

Gas impervious fabric.—Wingfoot Corporation. Nov. 15, 1945. 12954/46.

Disazo dyestuffs of the azosey type.—General Aniline & Film Corporation. Nov. 24, 1945. 27070/46.

Production of gelatin solutions of increased viscosity.—General Aniline & Film Corporation. Nov. 24, 1945. 29903/46.

Gelatin compositions of increased viscosity.—General Aniline & Film Corporation Nov. 24, 1945. 32521/46.

Production of quinoneimine and quinone dyestuff images.—General Aniline & Film Corporation. Nov. 20, 1945. 33149/46.

Production of oil from oil-bearing material of animal origin.—General Foods Corporation. May 26, 1942. 12045/47.

Electrostatic control of chemical reactions.—L.L.H. Co. Nov. 23, 1945. 21822/46.

Bearing materials and bearings made thereform.—Mallory Metallurgical Products, Ltd. Nov. 23, 1945. 34903/46.

Alloys.—Mathieson Alkali Works. Sept. 14, 1945. 17251/46.

Heterocyclic sulphur compounds and process of preparing the same.—Texaco Development Corporation. Nov. 21, 1945. 33811/46.

Process for the purification of synthetic lower aliphatic alcohols.—Usines de Melle. Nov. 21 1945, 10406/46.

Manufacture of cellulose esters.—British Celanese, Ltd. Dec. 6, 1945. 32265/45.

Manufacture of sulphur dioxide.—Ciba, Ltd. Dec. 6, 1945. 22094-95/46.

Method of combating pests and dry dusting preparations therefor.—Ciba, Ltd. Dec. 4, 1945. 34732-33/46.

Obtaining refined aluminium, starting from aluminium alloy scrap.—Compagnie de Produits Chimiques et Electro-Metallurgiques Alais, Froges, & Camargue. Dec. 3, 1945. 37983/46.

Crystallisers.—Comptoir des Textiles Artificiels. Dec. 6, 1945. 21172/46.

Preparation of difluorethane.—E.I. Du Pont de Nemours & Co. Dec. 7, 1945 36148-48/46.

Process for the production of catalysts.—E.I. Du Pont de Nemours & Co. Dec. 8, 1945. 36150/46.

Process for the manufacture of omega-ketones usable as intermediate products for the preparation of polymethine dyestuffs.—N.V. Gevaert Photo-Producten. Dec. 6, 1945. 34379/46.

Production of oxygen by liquefaction and rectification of air.—Hydrocarbon Research, Inc. Dec. 5, 1945. 35752-56/46.

Production of vinyl fluoride.—I.C.I., Ltd. Dec. 6, 1945. 36147/46.

Light-polarising material and process of making same.—International Polaroid Corporation. July 28, 1944. 17007/45.

Tetrafluoroethylene polymers.—Kinetic Chemicals, Inc. July 1, 1939. 13764/47.

Chemical compounds and process for preparing same.—Merck & Co., Inc. Aug. 24, 1945. 21981/46.

Process for increasing the rate of polymerisation of diallyl phthalate.—N.V. de Bataafsche Petroleum Maatschappij. Nov. 5, 1945. 30585/46.

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Preparation of substituted pyridines and intermediates thereof.—American Cyanamid Co. Nov. 29, 1945. 22289/46. (Cognate applications 22290-1-2/46.)

Separation of gaseous and gas-and-vapour mixtures.—American Magnesium Metals Corporation. May 18, 1940. 4848/47.

Method of deriving gas black from methane and from gases of which methane is a constituent.—R. Von. Becker. Nov. 29, 1945. 34008/46.

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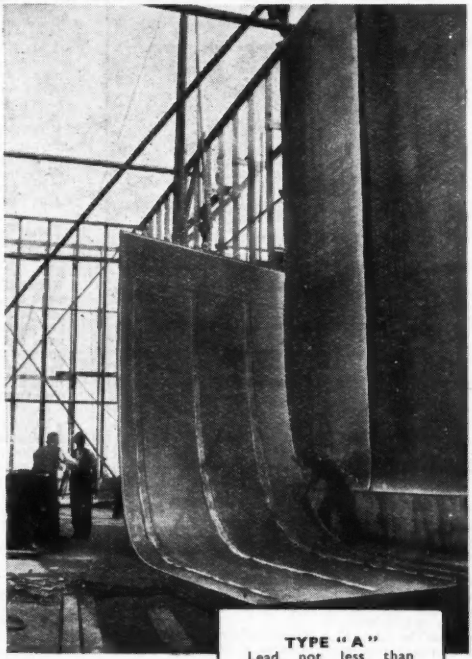

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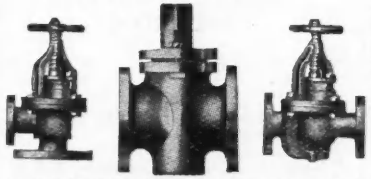

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